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PERCIVAL SHELDON RIDSDALE, Editor

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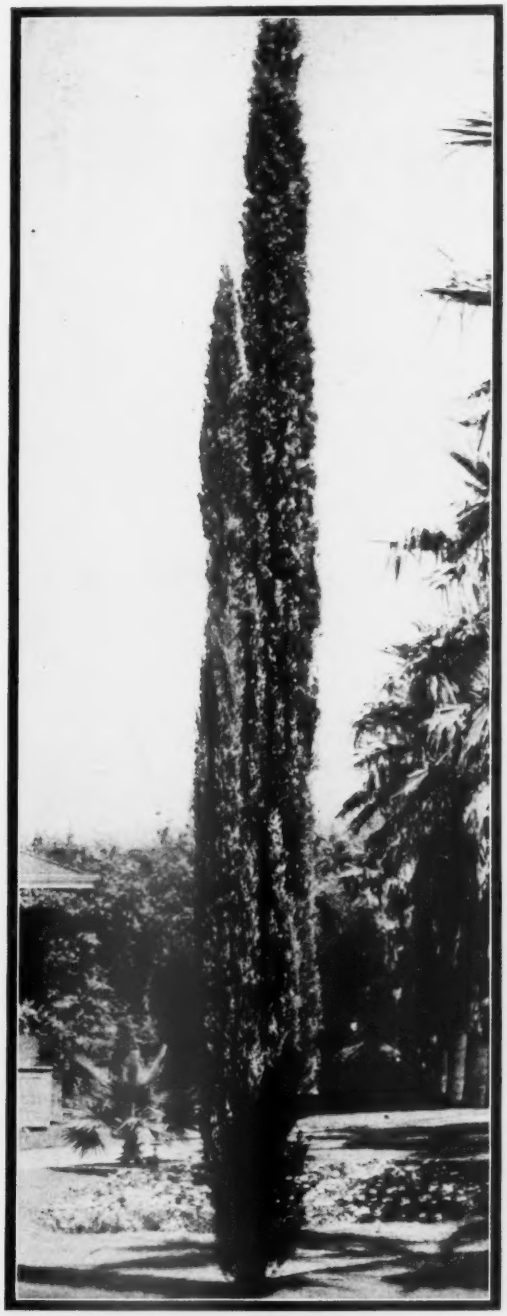

ITALIAN CYPRESS

This beautiful tree is a native of Europe and Asia. It is a tall, very slender, tapering tree, with branches lying close to the stem. Often used to line a driveway or enhance a vista, it is most adaptable for landscape work. (*Photograph by courtesy of the California Nursery Company.*)

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TREES HERE DOING A DOUBLE SERVICE

These trees not only hid advancing French and American troops from enemy flying machine observers, but provided lumber for such dugouts as are seen. Comparatively heavy timber covered with earth provided fairly good protection from the enemy shells and forests and woodlands were always shelled because they were used to conceal troops.

CANADIANS GETTING OUT HEAVY TIMBER

Heavy timber such as shown in this photograph was used for piling, bridge building, canal repair work, etc., by the Allies, while the Germans cut quantities of it to roof dugouts. These heavy timbers covered with several feet of earth made the dugouts safe from even the heaviest shells.

AMERICAN FORESTRY

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FRENCH FORESTS FOR OUR ARMY

BY PERCIVAL SHELDON RIDSDALE

EDITOR OF AMERICAN FORESTRY MAGAZINE

This is the second of a series of articles on the effect of the Great War on the forests of Europe, articles based on information secured during a tour of Great Britain, France, and Belgium in December, 1918, and January and February, 1919, taken for the purpose of investigating war-time forest losses and of ascertaining how best America can aid in restoring the forests of our Allies.—EDITOR.

TOURS, FRANCE, January 30, 1919.

HERE is the headquarters of the 20th Regiment of Engineers composed of lumbermen and foresters, the largest regiment in the world, and the organization upon which the American Expeditionary Force depended for its lumber for war needs and for its fuel wood. Here, since the organization was completed by the merging of the two battalions of the 10th Regiment, mostly forestry troops, with the 20th Regiment, mostly lumbermen, Col. James A. Woodruff, a West Pointer and regular army officer, has been in command, with Lieut.-Col. W. B. Greeley, of the United States Forest Service and a director of the American Forestry Association, assisting him in directing the operations.

Tours, being the headquarters for the S. O. S., —the Service of Supply—for the A. E. F., and being the concentration station for the supplies which are landed at Bordeaux, St. Nazaire and Brest, became the natural place to locate the directing forces of the 20th Regiment which supplied the troops with so much of the material which they needed in railroad, camp and trench construction.

Here it was possible not only to secure information regarding the work of the regiment but also, by automobile to visit some of the lumber camps to see the conditions under which the boys worked. The information received, the impressions secured, the conditions experienced I pass on to the readers of AMERICAN FORESTRY Magazine, not so much in the effort to give a detailed account of the accomplishments of the regiment, which will come in later articles, as to convey to them outstanding facts which should be of the most general interest.

First then the feature which attracts attention at once, the fact that it is the largest regiment in the world:

The regiment is composed of 49 companies of approximately 250 men each, divided into 14 battalions and having connected with it 36 Engineer Service Companies or labor troops. The regiment originally was organized to contain 48 companies, but the 49th was added in France, being composed of members of the New England Saw Mill Unit who had spent almost two years in cutting in the Scotch forests. Three officers and 90 men of this Saw Mill Unit volunteered as a nucleus of the 49th Company of the 20th Regiment and the full complement of the company was secured by getting men from other organizations.

The chief forest cutting of the regiment was in the Vosges section with Epinal as the headquarters of the operating companies. The forests there were chiefly of Scotch pine, fir and spruce. At Eclaron was the largest single installation, a mill capable of shipping, as it did, an average of five thousand ties a day. This mill was situated in the forests of Argonne and furnished lumber, largely duck boards, bridge timbers, piles and poles, etc., for the 1st and 2nd Armies. Colonel C. S. Chapman,

FRENCH FOREST LOSSES

$800,000,000 is the general estimate of the war losses and loss in reproduction value of the destroyed forests of France. It is estimated that 16,960,000,000 board feet of saw timber have been felled in the French forests since the war started. Nine-tenths of this timber was used for military purposes. In addition, military operations have destroyed 2,544,000,000 board feet, while the Germans confiscated 2,968,000,000 board feet. The total estimated drain on the French forests is, therefore, some 22,472,000,000 board feet. It would take France fully one hundred years to fully recuperate from these forest losses, for the productive capacity of the French forests has been reduced about 424,000,000 board feet a year over a very long period. Devastated forests in France cannot be put to agricultural uses because the soil is of such a quality that under French economic conditions the forest crop is the most profitable one that will grow upon land assigned for forest production.

with headquarters at Neufchatel had entire control of this advanced section and of all the operations in the departments of the Vosges, Doubs, Cote d'Or and Aube, so that his work consisted of supplying all the requisitions in the zone of active operations for the A. E. F.

The Eclaron mills were situated near some big ammunition dumps and as the plant was run all day and all night, being electrically lighted, it made a very good target for the German bombers. The mills were bombed several times but none of the workers were injured nor was much damage done, and finally a real American trick resulted in so misleading the German bombers that the danger was entirely overcome. This trick was devised by Major Spencer who, realizing that the electrically lighted mill was a bright target for the German bombers, ran electric wires into the heavy woods for a distance of one-third of a mile from the mill and installed a number of electric lights on the trees. Whenever an alarm of an air raid came, the lights of the mill were extinguished and the lights among the trees one-third of a mile from the mill were lighted by switching on the current and were kept blazing while the Germans wasted bombs on them and inflicted damage only on some of the trees.

WEAVING SUPPORTS FOR SIDES OF TRENCHES

This photograph shows the manner in which brush and small trees were used to prevent the earth on the sides of the trenches caving in. Great quantities of these mats were used by the Germans as well as the allied armies.

Other mills up along the fighting front were also bombed frequently, but without serious damage.

The amount of wood required by an army for fuel, in winter especially, is not appreciated by the civilian. For instance, at the time the armistice was signed, Lieutenant-Colonel A. S. Peck, assisted by Major R. J. Stuart, Captain Donald Bruce, Captain Joseph Kittridge, Jr., some twenty lieutenants and twenty sergeants of the 20th had charge of 10,000 quartermaster troops, all colored, cutting fire wood for the 1st and 2nd American Armies, at the fighting front, with headquarters at Chaumont. These men, cutting hard-wood coppice, and using transportation on forty and sixty centimeter railroads, by wagon truck or any other method of carriage available, and working always to get the wood cut as near the location of the troops as possible, managed to secure and maintain a daily production of about 3,000 cords of wood a day. This amount of wood supplied fuel for approximately 1,000,000 troops.

The first mills used by the regiment when its first units reached France were French mills, but their daily production was so low that the units changed to American built mills as soon as possible, and within a few months all of the mills in operation were using machinery sent from the United States.

At the time the armistice was signed, the regiment had eighty-one lumber mills in operation and twelve more being installed. The average value of these plants was $15,000 apiece When I was in France the sale of these saw mills and their machinery, which were of course of no further use to the American Army, was somewhat retarded, if not wholly prevented by army red tape. As one officer intimated, Congress is evidently afraid to trust an army officer to sell any army material, or so one might be led to believe, as the Act regarding the sale of army material provides that the sale price shall include not only the original cost, but also the cost of installation. As a result, many of the lumber mills will probably have to be scrapped and sold as scrap, if the officers of the 20th Regiment do not manage to get special permission to sell them at the best prices they can obtain.

The men of the regiment with whom I came in contact

at the lumber camps were in good health and fine physical condition, despite the generally disagreeable weather conditions of the winter months, their hard work and the fact that much of their labor was performed in the rain and mud. The majority of them had put on weight, which is not surprising when one considers the fact that they are unusually well cared for, particularly as far as their physical condition and their diet is concerned. After their ten hours of hard work each day, they return to their lumber camps, strip off their wet and muddy clothing, have hot showers with plenty of water and an entire change of dry clothing for the evening. Their diet is somewhat larger than that of the men in other units, on account of the very hard work which they do. I believe the increase in ration above other units is about seven per cent, and some of the officers stated that a ten or twelve per cent increase was most desirable. At any rate there seemed nothing lacking in the midday dinner which I had with Lieutenant-Colonel Greeley at the camp at Chenonceaux, where the 29th Company, in charge of Captain J. H. Price, was located. Here we had pot-roast, cut thick and piled high on the platter, rich gravy and plenty of it, potatoes, macaroni and tomatoes, canned cherries, con-

EFFECT OF SHELL AND RIFLE FIRE

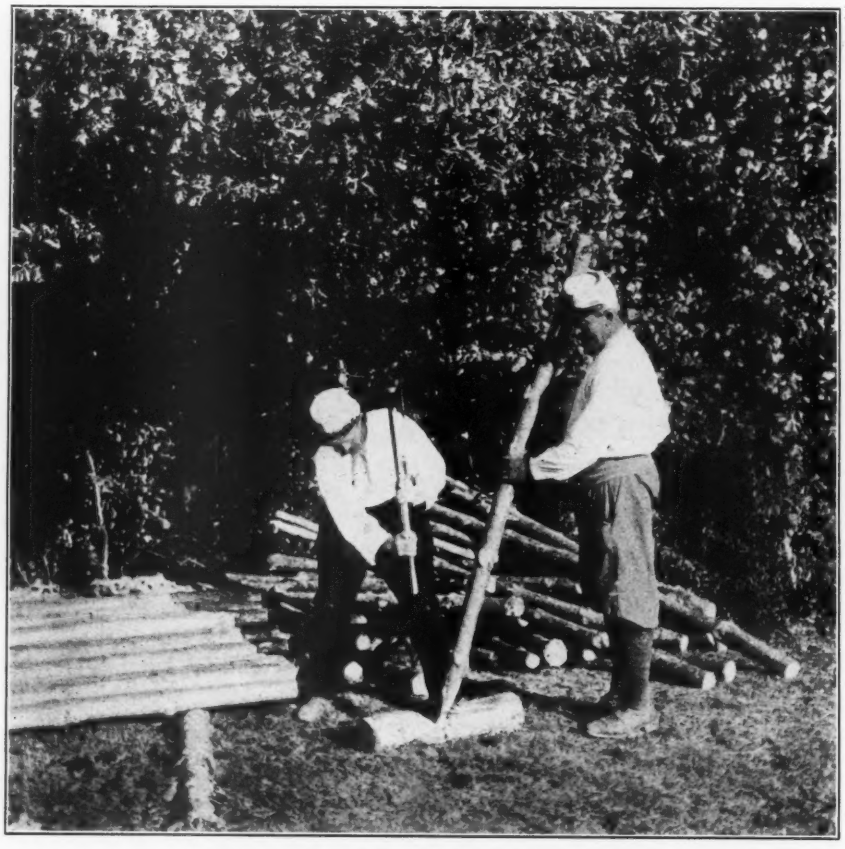
This was once a standard under coppice forest near Ribercourt and on the route to Lassingy. It was practically totally destroyed by the heavy firing during a prolonged battle.

FOREST CASUALTIES LIKE THESE ARE SEEN ALL ALONG THE FIGHTING FRONT

Wherever there has been a severe military action in woodlands or forests the trees have suffered much as these have. The scene is near Verdun and heavy shell fire swept the woods.

densed milk, sugar, butter, and a large thick peach pie, cut only twice, making each portion one-quarter of a pie, and a real American pie at that. So husky and vigorous are men living under these conditions that despite their ten hours of hard work during the day, their favorite recreation at night is in some athletic exercise or game.

At first the men were rather well crowded together, a few large barracks being erected at a camp and usually sixty men being assigned to each barrack. Later, however, it was found that the men were better contented and kept in better health by being separated in squad tents, or small barracks, with eight men to a squad. This arrangement greatly facilitated the isolation of ill men. The squad tents were boarded to a height of four feet and well sodded and floored. Each had a small stove, was equipped with six or eight bunks and was easy to keep warm and dry and comfortable. In some camps where tents were not to be had, huts were built and served the same purpose.



CUTTING AND SHARPENING BARBED WIRE STAKES

These stakes or poles from five to six feet in length used for supporting barbed wire entanglements were cut by the hundred thousand for use not only on the fighting line, but for second and third line defenses.

Various units of the regiment performed particularly good work during the September drive of the Allied Armies which forced the Germans back so quickly. During one day's operation, the American fighting

SMALL POSTS USED FOR WIRE ENTANGLEMENTS

Many hundreds of thousands of these posts were cut by the contending armies and on them was stretched thousands of miles of barbed wire. The line of trenches is indicated by the whitish soil. Many miles of such trenches formed lines of defense between the German advance and Paris.

A HEAVILY SHELLED ROAD NEAR RIBERCOURT

Here the automobile in which the writer toured the battlefront was stuck in a shell hole for six hours. A terrific battle had been fought over this ground, thousands of tons of war material was scattered in the fields and woods and within sight was an old quarry which housed several thousand German troops.

troops captured three rail heads and the immediate problem was to provide enough ties to connect these rail heads with the French railroads nearest to them. Thousands of ties were needed but by hard work with every available man, the Forest units assigned to the task of providing the ties, secured the desired number in a remarkably short time.

The 7th Battalion, which was placed at the disposal of the French Government, manufactured entirely free of cost to the French Government, the following quantities of timber: 4,468,000 board feet of lumber; 199,808 standard gauge ties; 191,604 narrow gauge ties; 127,475 poles and props; 54,647 steres of fuelwood. This is enough to build 665 barracks; 195 miles of railroad; 1,595 miles of telephone line on the basis that half the round material was poles; and warm a detachment of 500 French Infantry 150 years.

The casualties of the regiment were, of course, not large, as most of the men worked in sections far behind the range of German guns. Among the casualties, however, are those of two officers, Captain Harry H. MacPherson and Captain Wilford A. Fair, who were killed by German machine gunners on October 5, 1918. These men were looking for mill locations in the Argonne forests. In some manner the Germans got behind the troops in the advanced section during the night and the next morning as the two officers walked through the forests, hidden German machine gunners fired upon them. MacPherson fell, badly wounded and Fair gallantly ran forward to aid him and was killed as he knelt over his dying fellow-officer. Captain Fair was cited for gallantry.

First Lieutenant John H. Kelly was killed in a motor smash-up. Master Engineer George L. Nutter and Sergeant Alcott were killed at St. Julien by a railroad train while doing a rush loading job.

The influenza was serious at two or three camps and several men succumbed. At the Mimizan camp in the Lands Dis-

THE PRESIDENT AND THE BAKERS

When President Poncaire of France visited Chateau Thierry after the American troops drove out the Germans he complimented the bakers of the town upon their successful efforts to provide bread for the civilian population.

LUMBER USED IN TRENCH CONSTRUCTION

The sides of this trench of an advanced post of French troops along the Marne are braced by small branches woven together and nailed upright of two and three inches in diameter. The dugout is roofed with heavier timber. The trench shows the damage done by a German shell which exploded in it.

trict the 11th Company had a number of cases and fourteen deaths, among the dead being Corporal Charles J. Cumisky, who devoted himself to attending the sick men without thought of his own physical condition. Even after he had been stricken with the disease, he continued to work and finally fell exhausted and died shortly afterward. He was recommended for a Distinguished Service Medal.

Within an easy run from Tours by automobile, one may see scores of fine old chateaux, and among the most interesting of these is the Castle of Chambord. In the extensive grounds attached to the chateau, a considerable amount of forest cutting was done. The story of the arrangements for this cutting is interesting.

The castle was built during the sixteenth century as a hunting lodge for the Royal family and in order to keep the game in and to keep the poaching peasants out, a wall some ten or twelve feet high and about two feet thick, and twenty-one miles in circumference was built and is still standing and in good condition. When the war broke out this property, which is owned by an Austrian nobleman, was taken in charge by the French Government, under somewhat the same conditions as the Alien Property Custodian of the United States took charge of the property of aliens here, and as it contained some fine stands of pine, portions of its forests were leased to the American Forest Units and were cut.

To appreciate the manner in which the French, British, Canadians and Americans co-operated in the purchase of forests and in their lumber production it must be remembered that as early as September, 1916, because of increasing difficulties of transport, the British Army decided it would be necessary to secure its timber supplies in

THE WELL KNOWN DUCK BOARD

Each army made great quantities of these duck boards for the bottom of trenches and for muddy and slippery ground back of the trenches. The British, after the armistice was signed, manufactured 1,000,000 of the ten foot lengths on which the duck boards were nailed. These cost seven francs each and the British expected to sell them for no more than one franc each.

France. Accordingly, General MacDougal, head of the Canadian Forestry Corps, secured mill equipment and forestry companies to handle the exploitations. The forests were supplied free of charge by the French in return for certain tonnage which France required for the transport of raw materials.

It was not until September, 1917, that the Comite Franco-Brittannic de Bois de Guerre was organized by Lieutenant Sebastien, to handle the acquisition of standing timber and the purchase of manufactured lumber from Switzerland and other countries for the British Service. This Executive Committee worked under the supervision of General Chevalier, Chief of the Inspection Generale des Bois, under the Ministry of Armement, which controls all the wood centers of France.

THE FRENCH GAS MASK

Wood workers were often so close to the fighting that they had to wear gas masks for protection while gathering fuel wood or securing stakes for barbed wire.

When Lieutenant-Colonel Graves, Chief of the United States Forest Service, arrived in France to organize the American Forestry Section, one of his first decisions was to join this wood committee in order to avoid competition with other army services in France, and in order to reap the benefits of an efficient existing organization. Accordingly, in September, 1917, Colonel Graves was appointed American Delegate to this committee, and the name of the committee was changed to Comite Interallie des Bois de Guerre. The work of the larger organization was transacted by an executive committee composed of Lieutenant Sebastien for France; Colonel John Sutherland for Great Britain; Lieutenant-Colonel John Lyall for Canada, and Major T. S. Woolsey, Jr. (for standing timber) and Major Barrington Moore (for lumber, etc.) for the United States.

This committee which met twice a week, purchased all standing timber outside the army zone, for the British and American armies, and later was joined by a Belgian delegate, Major Parlongue. Timber purchase in the war zone, which consisted chiefly of fuel, was conducted by Lieutenant-Colonel Peck working through the French Mission at Chaumont at which city General Pershing established the American Expeditionary Force headquarters. Major Badrey, of the French Forestry Service, was attached to this mission for the express purpose of facilitating these purchases.

THE FRENCH CUT LOW

With true French thrift applied to forest cutting the French forests left stumps as low as cutting with axes or saws permitted.

Under an agreement between France and England, France supplied the standing timber, while England supplied the equipment and personnel, for manufacture and transport to the railways. When the Americans joined the C. I. B. G. the British were established in the Landes, Normandy, and in the Vosges-Jura. In addition there

were a few pole operations in central France, south of Orleans. Since this latter area was on the American line of communication, the British kindly withdrew their operations and ceded this area exclusively for American exploitation. One of the first problems was to define purchase areas for the use of the American or British services—the French retaining the right to purchase in all portions of France.

The Landes was divided so as to facilitate British water transport from Bordeaux and Bayonne to a port in northern France close to the British front. This arrangement was necessary because of shortage of rolling stock in France and the difficulties of transporting wood materials from Bordeaux north on the American lines of communication.

A PONTOON BRIDGE ACROSS THE MARNE

The rapidity with which these bridges are built when the lumber for the pontoons and for the bridge makes it necessary for the forestry units to be prepared to fill quickly all demands for pontoon lumber.

Similarly the Vosges and Jura timber areas were divided between the British and Americans so as to interfere to the least possible extent with their railway transport. The Vosges-Jura exploitations were particularly important for France since she secured a large per cent of her aviation material, manufactured by the Canadians, from the splendid spruce forests that make this region one of the most valuable in France. Normandy being near the British front was reserved for them.

Had it not been for the British and French co-operation, the A. E. F. undoubtedly would have paid far higher prices for their timber and would have had greater difficulty in securing it. According to Major Woolsey, of the 20th Regiment, the A. E. F. owes a debt of gratitude to Lieutenant-Colonel Sutherland and Lieutenant Sebastein of the C. I. B. G., for their co-operation. Lieutenant Sebastien, the head of the C. I. B. G. Executive, worked tirelessly in the interests of the Allied timber supply, not only having charge of the purchase of standing timber in the S. O. S. of France, but also negotiating important purchasing agreements with Switzerland, Spain, Portugal and Scandinavian countries. Repeatedly, when the situation demanded, Colonel Sutherland withdrew his claims to important forests, which were badly needed by the American Section.

On account of war speculation, the price of timber in France had more than doubled since the beginning of the war. In the Jura, timber which before the war brought $16.00 per thousand feet on the stump sold for from $32.00 to $45.00 per thousand feet, counting 3½ cubic meters of standing timber as equal to one thousand board feet.

It was owing to the assistance of Lieutenant-Colonel Joubaire, chairman of the French committee having charge of the purchase or leasing of private forests, that

the A. E. F. was able to purchase private forests at even less than the current market rate. Colonel Joubaire unquestionably saved the United States more than a million dollars because of his skill in treating with private owners.

FRENCH FORESTRY TROOPS

There is no waste in this kind of cutting nor is there any waste in disposing of tops and small branches. These are either used by the soldiers for fuel wood or civilians pay for the privilege of gathering them for fuel.

Take this as an illustration: One of the first forests operated by American troops—the Forest of Boisgenceau—was offered for $800,000 by an Italian speculator, and when the C. I. B. G. saw that the price was exhorbitant the forest was immediately requisitioned for war needs. The appraisal of Colonel Joubaire on the value of the forest was secured and the final purchase price was close to $140,000 as opposed to $800,000 originally asked. In innumerable cases, where the demands of private owners have been exhorbitant, as they almost invariably were, Colonel Joubaire was able to reduce the price to an equitable figure. When it is considered that the A. E. F., when the final settlement is made, will have purchased some $10,000,000 of standing timber in France, the importance of the co-operation secured through the C. I. B. G. can be fully appreciated.

About 40 per cent of French forests are State forests, about 20 per cent Communal and about 40 per cent private. The prices for the State and Communal forests were fixed by a Committee of the Department of Agriculture and the stumpage prices were based on the market value, which arose to two or three times the pre-war value. The sale of private forests and the prices for them were fixed by a Committee from the Board of Armament, and it is interesting to note that the prices for these private forests were about fifteen per cent below the prices fixed by the Committee of the Department of Agriculture. Some private forest owners desired clean cutting, so that they might take every possible advantage of the prevailing high prices for their timber. Others with an eye to future production permitted cutting on a forestry basis only, while all the cutting of State and Communal forests was entirely on a forestry basis and was so regulated that on the average the productive value of such forests was restricted not more than five years.

As France, prior to the starting of the war, imported about 1,484,000,000 board feet of manufactured material more than she produced, the French shortage must now be met by continued over-exploitation of her forest resources, by commercial imports, or by imposing a refund of German timber from German forests.

Over-exploitation is, of course, impossible because if continued it would bring erosion, floods and unfavorable climatic conditions, and would destroy local wood industries upon which many thousands of French people

depend, in a considerable measure, for their livelihood.

Importation is undesirable because of the high cost.

What the French prefer and advocate, is a provision in the Peace Treaty for compelling Germany to refund to France the amount of timber destroyed in France. That Germany is capable of doing this is evident as she is rich in forest wealth. Her total wooded area amounts to almost 35,000,000 acres and her annual production, exclusive of fire wood, is about 8,500,000,000 board feet. erage and vehicles. Large lumber such as yellow pine, Douglas fir, etc., is desired for bridge, railroad and canal repair and construction. Most of the construction lumber and general lumber which she may need can be supplied from her own resources and after a short time may be secured from the Baltic region at lower prices than she could secure the same lumber from America. Finland has a quantity of lumber ready to ship and lacks only the shipping. This timber is from forests cut on about

WORK FOR FOREST REGIMENT UNITS AND BRIDGE ENGINEERS

The Germans destroyed this bridge in their retreat from Chateau Thierry and pontoons made of lumber produced by the 20th Regiment units near the fighting line and constructed by bridge engineers were needed for the troops advancing in pursuit.

Lumbermen of the United States are naturally curious to learn of lumber trade possibilities in Europe, and it was therefore interesting to secure information regarding the possibility of American lumber finding a market in France. Some inquiries revealed the information that there is a possible market for hardwoods of the best grade for interior work, parquet flooring, furniture, cooper a fifty-year rotation period. The American lumbermen must realize the necessity in developing a market abroad, of taking advantage of the Webb Law, establishing agencies, meeting earnest competition and making a market for the sale of their best material to the high-class trade by using clever salesmen earnestly advertising their goods and quickly meeting the market conditions.

CASCARA STUMPAGE ADVERTISED ON SIUSLAW

THE first advertisement of cascara-bark stumpage on the National Forests is now being run. The advertisement covers some eight hundred acres on the Smith River drainage basin in the Siuslaw National Forest, which is estimated to yield twenty thousand pounds of dry cascara-bark. The minimum price named is three cents per pound, which has been the prevailing price for cascara-bark stumpage on the National Forest during the high prices of the last year. Many sales of cascara-bark, aggregating thousands of pounds, are made every year on the Siuslaw, but most of the sales are for small amounts. Pealing of cascara-bark is ordinarily distinctly a home industry, done by the settler with perhaps the help of some member of his family.

THE USES OF WOOD

WOODEN BOATS AND THEIR MANUFACTURE

BY HU MAXWELL

Editor's Note:—This is the twelfth story in a series of important and very valuable articles by Mr. Maxwell on wood and its uses. The series will thoroughly cover the various phases of the subject, from the beginnings in the forest through the processes of logging, lumbering, transportation and milling, considering in detail the whole field of the utilization and manufacture of wood.

STATISTICS of the woods used in the building of ships and boats, as they are referred to in this article, belong to the period immediately preceding the beginning of the war. No similar figures have been published covering the time since the war began. Pine, fir, and oak supply most of the woods consumed in the ship industry: pine 80,000,000 feet a year; fir, 44,000,000, and oak, 32,000,000. These are round numbers and some of them should be given more in detail. The principal pines used by the makers of ships are the following:

Southern yellow pine, 65,698,652; white pine, 14,256,006; western yellow pine, 518,500; sugar pine, 200,500; total pine, 80,673,658.

Three or more southern yellow pines contribute to the total, notably, longleaf, shortleaf, and loblolly. Northern white pine and Idaho white pine are listed without distinction. Western yellow pine is a single species, and that is also true of sugar pine. Forty per cent of all the wood used by American boat builders is pine. Twenty per cent of all is fir. A dozen species of fir are native of the United States, but nearly all that goes into boat building is Douglas fir.

Other softwoods play a rather small part in shipbuilding, though some of them are quite valuable for particular purposes. The following table gives the annual consumption of softwoods:

Pine, 80,673,658; fir, 44,342,080; spruce, 7,783,980; cedar, 6,999,722; cypress, 5,014,775; hemlock, 4,745,775; redwood, 837,500; larch, 328,525; total, 150,728,011.

No foreign softwoods have been reported in our shipbuilding though several imported hardwoods are listed, as is shown in the following table of foreign hardwoods:

Mahogany, 1,190,192; teak, 764,309; eucalyptus, 273,050; Spanish cedar, 27,300; Circassian walnut, 25,000; balsa, 20,000; lignum vitae, 10,000; padouk, 8,375; rungus, 500; cocobola, 200; total, 2,319,557.

Most of the foreign wood is worked into finish and specialties for large and small boats. Teak is

A CATBOAT UNDER SAIL

The man who understands the manipulation of a catboat possesses the key to a world of enjoyment which is unknown to the uninitiated; but the novice may be brought to realize the meaning of the proverb: "Hard to manage as a catboat in a squall." The picture is shown by courtesy of Daniel Crosby & Son, Oysterville, Massachusetts.

deck wood, mahogany, Circassian walnut, Spanish cedar, and padouk, go into finish, eucalyptus is made into tree-nails, balsa into life preservers, and lignum vitae is choice material for bearings or gudgeons.

Domestic hardwoods contribute more than 46,000,000 feet a year to the boat-building industry, the separate contributions being shown in the list below:

Oak, 32,382,311; ash, 7,985,554; birch, 1,055,167; maple, 1,014,167; basswood, 959,000; chestnut, 751,295; elm, 706,600; yellow poplar, 448,077; beech, 219,366; locust, 215,028; cherry, 184,976; red gum, 164,000; tupelo, 138,490; hickory, 110,195; butternut, 78,237; California laurel, 47,500; sycamore, 38,000; cottonwood, 14,026; black walnut, 3,750; apple, 1,500; willow, 1,000; wild china, 1,000; total, 46,519,239.

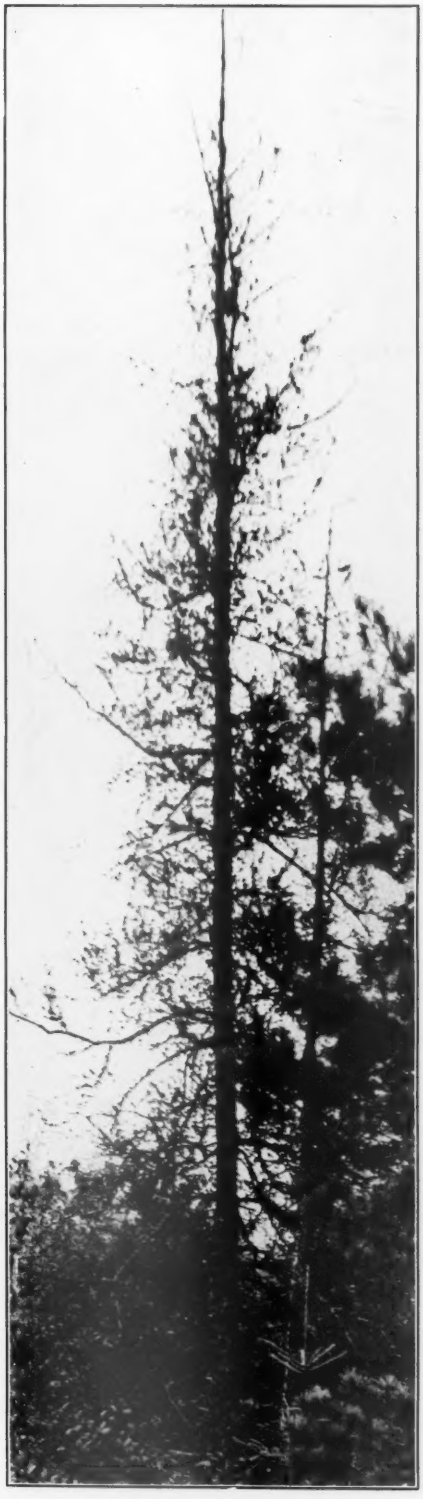
Some of these woods have special uses, but it may be said of them generally that they fill places where strength, hardness, or beauty is required. The strong and hard woods in the list are oak, ash, birch, beech, locust, and hickory; the beautiful in grain or color are oak, ash, birch, chestnut, cherry, gum, butternut, California laurel, sycamore, black walnut, and apple; the tough are elm, hickory, cottonwood, and willow.

It would be interesting to know what changes the war has brought in kinds and quantity of woods demanded by ship yards; but that information is not yet obtainable and probably will not be for two or three years after the close of the war.

It was customary in England after the Revolutionary war had separated this country from that, to speak of American vessels as "fir ships." That was the custom especially when war ships were under discussion. It was not done in a spirit of praise, and yet it was not ridicule. They used the word fir as a general name for all American softwoods—pine in particular. American ships then were largely pine, either southern yellow pine from Georgia or the Carolinas, or white pine from New York or New England. Pine prevailed in shipbuilding then and it prevails yet; but changes have occurred in sources of supply during a century or more. Formerly nearly all the timber was cut near the Atlantic coast; but now thirty-one states build boats, as may be seen by the

HIGHEST GRADE SHIP TIMBERS

Douglas fir met the emergency when the call came for ships in a hurry to send our army across the sea. This is a fir ship under construction, and the builders were never held up an hour on account of shortage of timber. It came faster than the carpenters could use it. The photograph was furnished for this cut by the West Coast Lumbermen's Association.



A LARCH IN NORTHERN MICHIGAN

The larch or tamarack furnishes roots of peculiar value in boat building. The large, sharply-bent taproot makes a knee to brace ship frames. The long, fibrous roots supplied the thread with which the Indians sewed together the pieces of bark in making their canoes. The larch sheds its leaves in winter, hence its nakedness in the picture.

following table which gives the annual demand by states for shipbuilding woods, the figures representing feet:

New York, 37,700,500; Pennsylvania, 26,716,000; California, 20,617,010; Oregon, 14,900,400; New Jersey, 13,341,796; Virginia, 11,138,497; Maine, 10,299,400; Delaware, 7,867,136; Connecticut, 7,084,354; Maryland, 6,350,700; Washington, 5,876,560; Massachusetts, 4,607,864; Louisiana, 4,589,300; Michigan, 4,480,200; Ohio, 3,322,660; Wisconsin, 2,669,000; Tennessee, 1,775,000; Florida, 1,615,000; West Virginia, 1,614,000; Indiana, 1,462,000; Arkansas, 1,210,000; Illinois, 1,020,000; North Carolina, 800,000; South Carolina, 756,000; District of Columbia, 535,000; Alabama, 511,000; Missouri, 431,000; Rhode Island, 414,000; Minnesota, 107,000; Idaho, 63,000.

The wood with which to build boats is doubtless procured in the forests of more than thirty-one states, but the reports do not show the origin of the timber which shipbuilders use, though it is well known that every forested region furnishes some of it.

The ship industry gives a better line on trade, from the historical view, than any other industry gives. Most commodities are intended to be sold in the markets of this and foreign countries; but ships are designed, not to be themselves sold, but to carry other products to market, and ships have never been built unless the builders were reasonably certain of cargoes. During early years American-built vessels carried cargoes to and from our shores, and while that condition existed, our shipbuilding was a pretty fair index to our sea borne trade. But gradually foreign vessels captured our ocean-borne traffic and our vessels almost dis-

A SPLENDID CANOE TREE

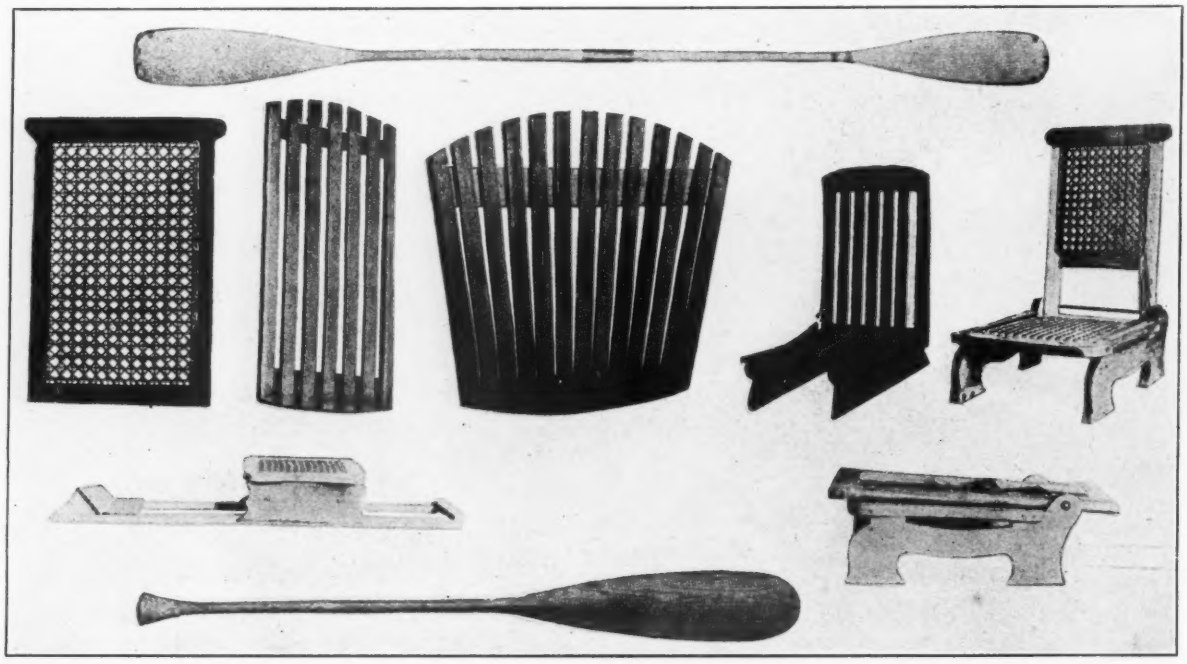
The yellow or tulip poplar was formerly known as the canoe poplar because it was the best in the eastern states for dugout canoes, hewed from its faultless trunk. Such trees are now sawed into house finish and stock for making vehicle bodies. It is the largest hardwood tree of the United States.

appeared from the seas. A discussion of the causes of that unfortunate state of affairs does not fall within the scope of this article. The early builders of ships and boats in America brought the art with them when they crossed the sea. Among them were men who were masters of the business. They belonged to the foremost seafaring people of that period; and when they landed on the eastern coast of the New World their practiced eyes quickly surveyed the unbroken forests and saw an abundance of ship material ready for cutting. They had scarcely set foot on the shore before some of them began to build ships, and their descendants have been building ships ever since. They received occasional hints from the native Americans, but no serious lessons, for the Indians were poor seafarers. Some of them ventured in their light boats a a few miles from shore to fish, fight, or hunt, but their cheif activities afloat were confined to rivers, lakes, and other inland waters. The Indians' boats were built for smooth waters, for the most part, and along that particular line they were able to teach the newcomers, and they did so. Nevertheless, not much that was new in making boats or in sailing them was found in America. Nearly all that the aborigines knew had been known hundreds or thousands of years before by people of the Old World. The Indian's canoe was the most interesting of his inventions or discoveries as a means of water travel, and he had two kinds of canoes, one of bark, and one of wood. It is not necessary to deal with these at length, but it is proper to speak of them, because canoes modeled after those of the Indians preformed a very important part in our early history, and these canoes are with us yet, though in modified form. They are used now for pleasure more than for business.

THE IDEAL BARK CANOE

Canoes like that in the picture may be seen in dreams and heard of in romance, but such things in real life are not much in evidence. Let no one look for a canoe, which is little longer than a man, carrying two persons while floating high and graceful as a white swan. They are met with only on the pages of summer resort folders.

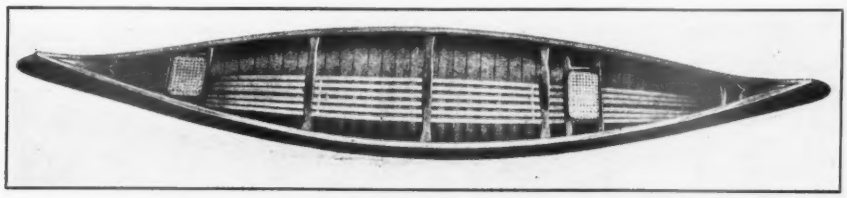
The bark canoe was most in use on northern waters, and it was generally made of the bark of paper birch, though some were made of the bark of elm, basswood, hickory, and of other trees. The



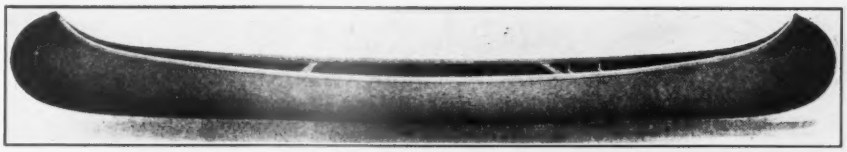
ADJUNCTS OF PLEASURE BOATS

These articles consist of a single and a double paddle, three styles of back rests and two folding canoe chairs, and adjustable rowing seats. Such articles belong in the industry which makes boats and supplies, and they are produced in very great quantities.

pieces of bark were sewed together with strips of hickory, basswood, or wicopy bark, or with the fibrous roots of tamarack; and the seams were made watertight with pine and balsam resin, or with the pulpy inner bark of slippery elm. Such canoes varied in size from the shallow coracle four feet long, thirty inches wide, and six inches deep, up to the trading vessel thirty feet long, thirty inches deep, and four and a half feet wide. When offered for sale, the largest bark canoes were held at about forty dollars. They were very important in trade, travel, and war. Alexander Mackenzie took one of them from the region of the Great Lakes to the Bering Sea by way of the Mackenzie and the Yukon Rivers. That was perhaps the longest single journey ever made in a boat propelled by human power alone. Bark canoes sometimes carried sails, and Louis Hennepin is authority for the claim that they could cover a distance of 160 to 180 miles in a day under sails made of bark. New England Indians with fleets of bark canoes engaged in battle on the ocean, according to Roger Williams; and a fleet of fifty bark canoes and one hundred and seventy dugouts was mobilized on the Allegheny River in 1753 by the French for the invasion of the Ohio Valley. Lawson in his account of the Carolinas states that the Indians of that region hunted whales by sailing after them in canoes, mounting on their backs, and plugging their spouts with wood, thus killing the monsters. It is apparent that the flimsy vessel has played its part in history and romance. The bark canoe long ago disappeared except as a plaything to induce tourists to part with their dimes at resorts. It is believed that no factory makes bark canoes, though a few are still made by individuals.

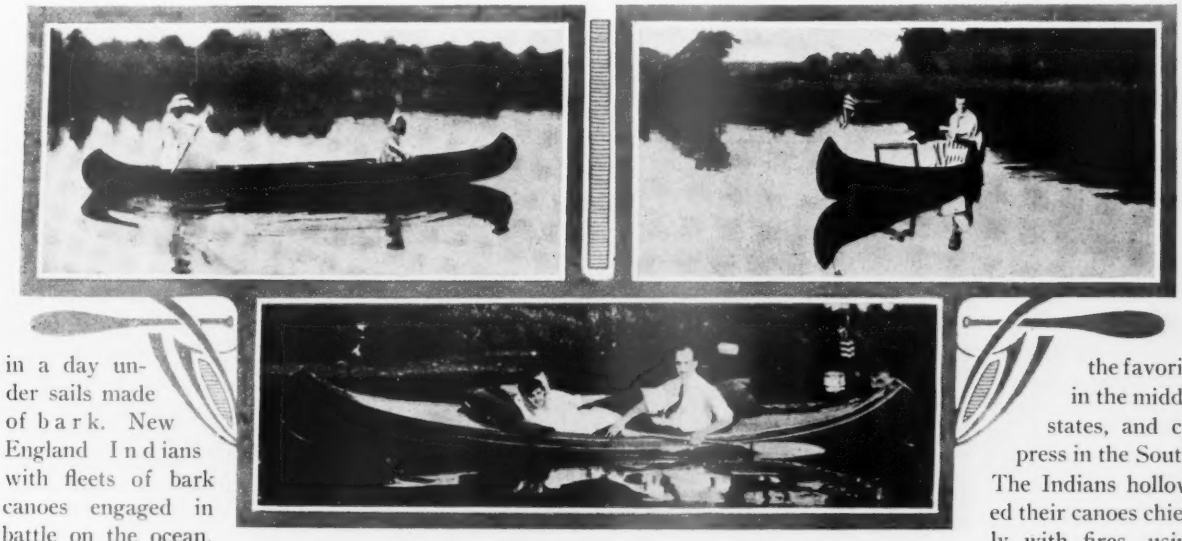


The dugout is a canoe hollowed from the trunk of a tree, and in the past this boat varied in size from little troughs barely large enough to carry one man, up to enormous hollowed trees which might carry fifty men and their equipment. The Jesuit missionaries mentioned canoes a hundred or more feet long. The largest dugouts on record were made by Pacific Coast Indians of red cedar. Nearly any tree can be made into a dugout if the trunk is large enough, solid, and straight. White pine served well, yellow poplar was the favorite in the middle states, and cypress in the South. The Indians hollowed their canoes chiefly with fires, using stones and shell as scrapers to finish the work. Other good canoe woods were sycamore, black walnut, butternut, cucumber, sassafras, ash, cherry, and red and white cedar. The lighter cedar canoe was the ordinary means by which the early farmers of New Jersey and eastern Pennsylvania carried their produce to market, according to Peter Kalm who wrote



BIRCH BARK CANOE MODEL

The northern Indians reached such perfection in their birch bark canoes that the white man was never able to make any improvements in the model. The above cut gives two views, one sidewise, the other perpendicular, looking down into the canoe. No bark canoes are now on the market, though an occasional one is made for private use.



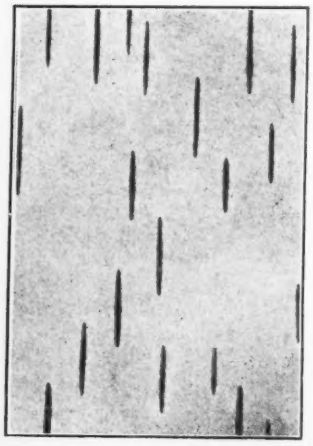
IN A LIGHTER VEIN

Canoes built for pleasure hold their proper place in the ship and boat industry. Such canoes are met with by hundreds on lakes and rivers in the north country in summer. They are marvels of lightness, grace and beauty, and are constructed of the finest woods obtainable.

LIVE OAK FOR SHIP KNEES

This is a fair and fine specimen of the southern live oak of which the largest ship knees have been made. This particular tree stands within the corporate limits of New Orleans and it is known locally as the "dueling oak," leaving the imagination to conjure up whatever uncanny associations it will, to account for the omnious name.

about 1749. The dugout was the primitive ferryboat almost everywhere in the eastern region before bridges were built, and made travel on foot possible and assisted the development of the country. As with the bark canoe, the dugout is seeing its last days and has disappeared except in a few remote districts where a relic may occasionally be seen. A log of suitable size and form for an average dugout would saw from 500 to 1000 feet of lumber. Dugout canoes were common in Europe in very early times, as they doubtless were in all countries that had suitable timber.



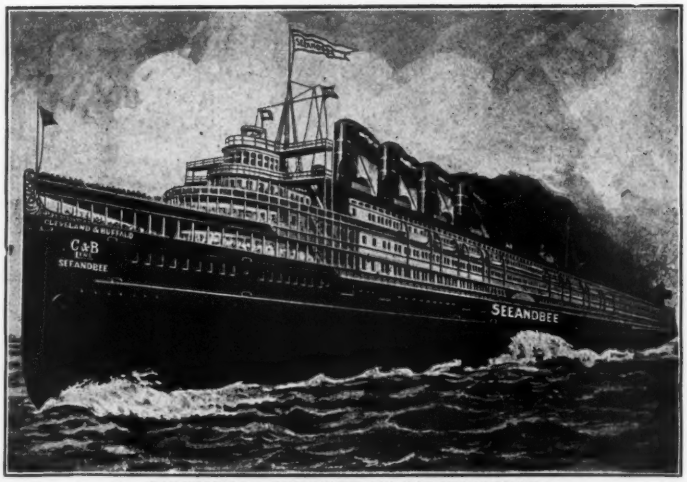
THE BARK OF WHICH CANOES WERE MADE

Most Indian canoes in the North were of thin sheets of the bark of paper birch, stretched over frames of wood to hold it in shape. The above picture shows a sheet of this bark. The long lines in the bark are characteristic of this birch, though not peculiar to it. Similar markings may often be seen in cherry bark.

The Indian canoe was valuable in its days. Formerly the settler or hunter went into the woods with ax, knife, and adz, and made his canoe. Today canoes, and all the light, small boats developed along the same lines, are factory made. The manufacturer selects his wood as carefully as ever the red hunter selected it, and he works it more skilfully and turns out a handsomer product. The light canoe which is now sold in sporting stores is modeled after the bark canoe more than after the dugout, though both shapes are retained in modern production. The Indian and the white trapper made a frame of light sticks and slats, and over it they stretched the bark forming the skin of the vessel. The modern manufacturer makes a frame of slats also, but he makes the shell of his canoe of thin lumber in place of bark, or he may stretch waterproof canvas over a frame and make a collapsible boat. The modern canoe is a little more substantial than the Indian's handiwork, but what the modern canoe gains over its prototype in substantiability it loses in romance. "The forest life," "with its mystery and magic," of which Longfellow spoke in Hiawatha, is not in the factory canoe as it was in that made of cedar slats, birch bark, and tamarack roots, by the wild hunters of the wilderness.

The bateau as formerly used in America was a flat-bottomed boat whose chief business consisted in carrying merchandise on the rivers and small lakes. The name was applied rather loosely to boats of several kinds and sizes; but one of the earliest patterns was made by sawing a dugout canoe down the middle from end to end, separating the halves four or five feet, still leaving them parallel, and nailing boards across to form a bottom. Bateaus made in that way carried large loads and sometimes ventured out to sea for long cruises up and down the coast. Fifty or sixty barrels of flour could be carried at a single load.

The bateau is not much spoken of by that name now, but it has been modified, developed, and enlarged until it



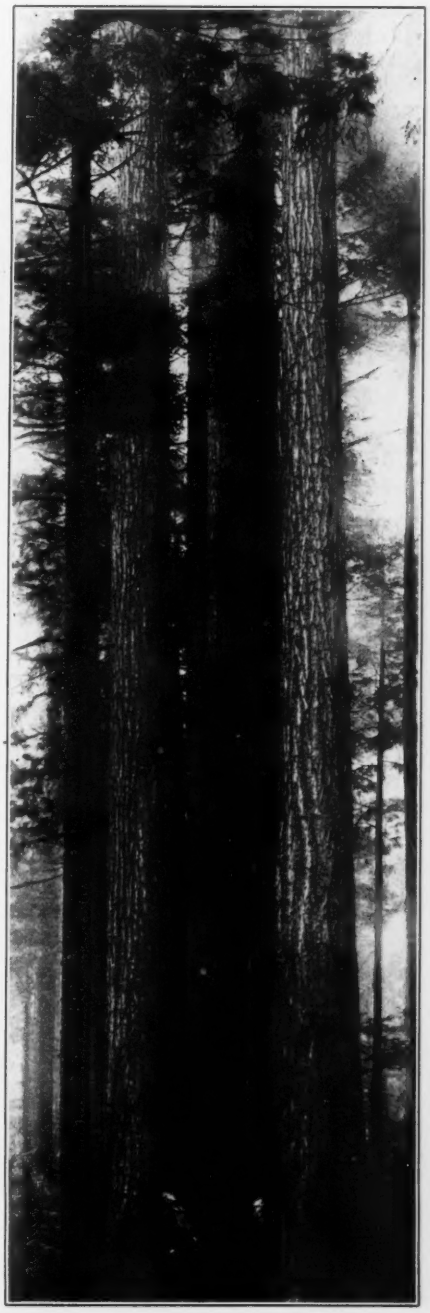
CALIFORNIA REDWOOD IN SHIPBUILDING

This splendid steamship is the Seeandbee of the Cleveland and Buffalo Transit Company. It is said to be the largest side-wheel ship in the world. The staterooms, partitions, canvas-covered decks and some other parts are of redwood. The cut is here shown by courtesy of the California Redwood Association.

has become the canal boat and the river barge of the present time. It always was and still is a slow and sluggish traveler and a carrier of heavy burdens. By building on it a superstructure, it becomes a houseboat, and many a one has assumed the dignity of a moving human residence. Such boats played a leading part in the "westward movement." Emigrants and homeseekers who "went west" four or five generations ago built or bought such boats on the banks of the Ohio, Mississippi, Tennessee, Monongahela, and other rivers, and floated with the currents; or poled or paddled; or pulled or pushed their boats against the currents, and in that way worked slowly and courageously toward the land of promise. Their boats were of wood, usually to the last peg and treenail; and with broadaxes, poleaxes, crosscut saws, whipsaws, augers, and adzes, the boats were built of oak, yellow poplar, black walnut, cypress, and pine, before sawmills and shipyards made their appearance beyond the frontiers.

ONCE WAS IMPORTANT IN BOAT BUILDING

This is a balsam fir. It is not now of any special importance in the boat business, but it was the source of the balsam with which the Indian canoe maker stopped the leaks in his frail vessels and made them serviceable. When Hiawatha made his canoe he "took the tears of balsam" and made it waterproof, as Longfellow tells the story.



SUPERFINE SHIP MATERIAL

Approximately a half a trillion feet of Douglas fir yet remain in the forests, according to the best estimates. No scarcity of ship material in the near future need be feared. Groups of trees like these in the above picture explain how it is possible for a single tree specie to produce such extraordinary amounts of timber. Photograph by the Kent Lumber Company, Seattle, Washington.

The trade boats intended for upstream travel were usually known as keelboats, and they were very important on western rivers in the period intervening between the canoe and the steamboat. Keelboats were propelled by men with poles, and were made of any convenient wood, but yellow poplar and black walnut predominated on the Ohio River.

Pittsburgh was a noted point for traffic boats in early times, as it still is. Eastern adventurers gathered there

to "start west," and not only dozens, scores, and hundreds, but thousands of flat-bottomed boats were built in that vicinity to carry settlers to Kentucky, Ohio, Indiana Illinois and Missouri. Today enormous barges assemble at Pittsburgh, as the pioneer boats assembled there a century or a century and a half ago, and move off down the river toward the west; but today they carry coal instead of emigrants. The same forests which furnished the planks for the bateaus of 1783, and the keelboats of a later time, still furnish planks for the coal-bearing river barges of 1918.

The wooden ships of commerce that sailed the seas during the early period of our history, and down to the present, have been made from relatively few woods, considering that our forests contain nearly six hundred species. The wood must be suitable and convenient. On the Atlantic coast white and yellow pine and white oak have been in most demand, but some elm has found place, as also a little hemlock, chestnut, beech, Norway pine, and yellow poplar. On the Pacific coast Douglas fir and Port Orford cedar were used in early shipbuilding and are still so used. The construction of ocean-going merchant vessels on rivers far from the sea was an early industry. The upper Ohio, from the vicinity of Pittsburgh to Marietta, Ohio, was busy with shipbuilding before the opening of the nineteenth century. Ships built there, 2000 miles by the river highway from the sea, were important carriers of American commerce. One of the ships when it reached Italy, was detained by the officials because the port of clearance was believed to be fictitious. They had never heard of Marietta. Ships built on the upper Ohio passed down the river at frequent intervals on their way to the sea, and carried cargoes to the West Indies, France, Italy, and to other foreign countries besides carrying coal, flour, glass, pork, and furniture to Philadelphia and other home ports. The first cargo of coal from Pittsburgh to Philadelphia, 1794, by way of the Gulf of Mexico, sold at $10.50 a ton at Philadelphia. It is worth mentioning that the Pittsburgh and Marietta ships were made largely of black walnut, and the wood attracted attention among shipbuilders because of its durability and on account of its great strength in proportion to its weight. The furniture carried in sailing ships from Pittsburgh was largely black walnut, cherry, and yellow birch, and it found a good market in the Atlantic coast cities.

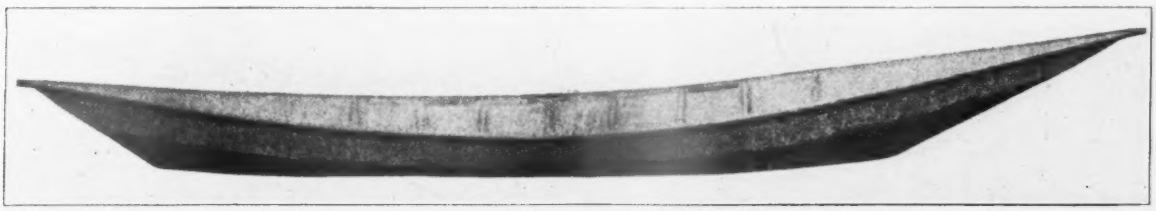
WESTERN CANOE CEDAR

This is the western red, or giant, cedar, and the picture is shown by courtesy of the Three Lakes Lumber Company. It was of this cedar that the Pacific Coast Indians made their remarkable canoes, some of which would carry nearly or quite a hundred men. The wood is soft and is easy to hew. Few dugouts are now made of it.

The United States entered upon its navy program at a time when it had become necessary to provide ships with which to fight the Mediterranean pirates, late in the eighteenth century and early in the nineteenth. Several vessels were constructed of southern pine and live oak. The first six ships contributed greatly to the early history and the romance of the United States. These ships were

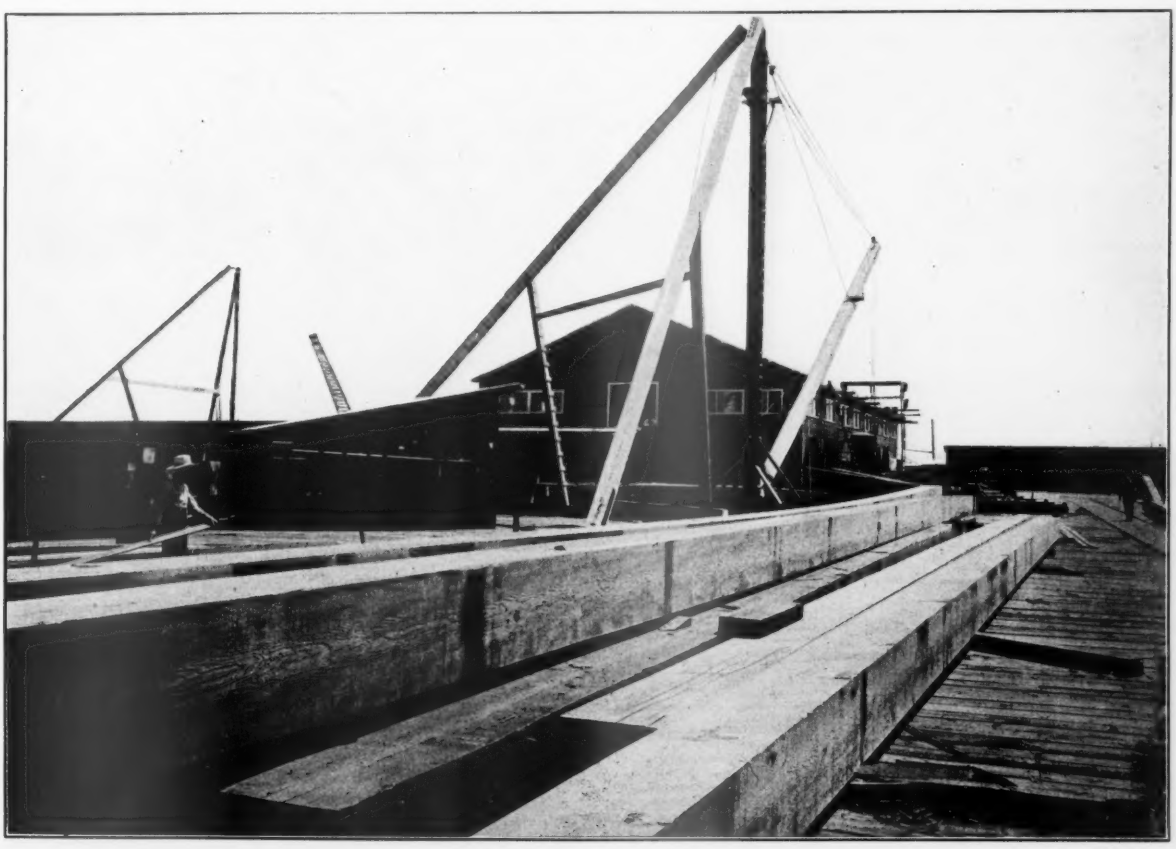
the *Congress, Constitution, President, United States, Constellation,* and *Chesapeake.* They were built of yellow pine, live oak, and locust. The *Constitution* was the famous "Old Ironsides" and it was never defeated though it fought many battles. It is still afloat, though much patched. The *United States* fell into the hands of the Confederates early in the Civil War, and when it was about to be recaptured, they sunk it in the Elizabeth River. It was raised, and it rounded out its 112 years of service. The *Chesapeake* was captured by the British in the War of 1812, but the commander's last command before his death in the fight has become a famous rallying cry, "Don't give up the ship." The shot-marked timbers were used in building a mill in England which was still in existence a few years ago.

When these six ships were planned it was believed that war vessels could not properly be built in America without live oak timber. The strong knees, cut from roots, limbs, and trunks, were the best in the world, and the planking and frames were nearly indestructible. In order to make sure of a supply of this splendid timber for all time, the government entered upon a policy of buying live oak land and secured several tracts in Florida and Louisiana. That was really the beginning of the National Forest Service. It is worthy of note that the policy of buying land at that time was opposed, and prominent men urged the purchase of oak without the land. Their ideas of what would be needed were betrayed by the declaration of Benjamin Stoddart, a naval officer of that time (1799) that "$100,000 will buy enough timber to



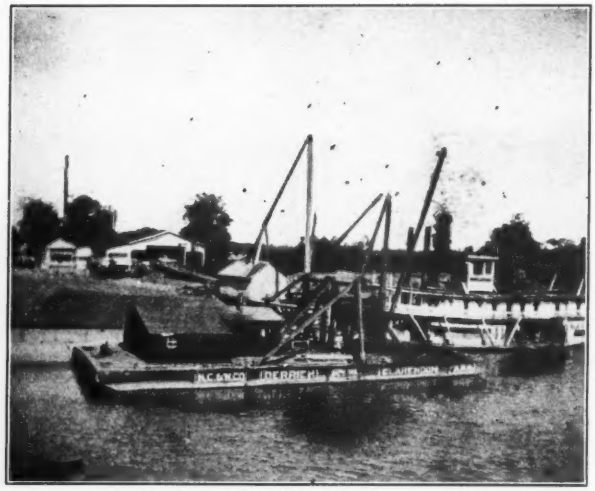
THE BATEAU STILL CARRIES TRADE

Bateaus, those serviceable boats of burden of the olden days, did not all disappear when the steamboat was invented. The accompanying cut represents a bateau advertised by its builder as being "for river and lake use," having "exceptional carrying capacity" and in great demand "among lumbermen, river drivers and contractors."



WITHOUT A RIVAL IN THE WORLD

Long, large and clear Douglas fir timbers like these were recently shipped by the trainload across the continent to eastern shipyards where a shortage of such stock threatened to tie up building operations and delay the completion of transports to carry American troops to Europe. Supplies were ample and the transports were completed in time, as is now a well-known fact.



SCOWS AND BARGES

Boats may be useful without being pleasing in appearance. Scows, dredges, barges and others that are designed to work in unromantic situations, are as necessary as are any others. They are generally built of heavy and durable planks and timbers to provide the strength which they must have to assure long service.

supply the navy for ages." Small prophetic vision had he of the mighty demands that would be made upon our forests to provide ships for our war with Germany in 1917 and 1918. All the timber needed for our first navy would scarcely supply one of our shipyards one month at this time.

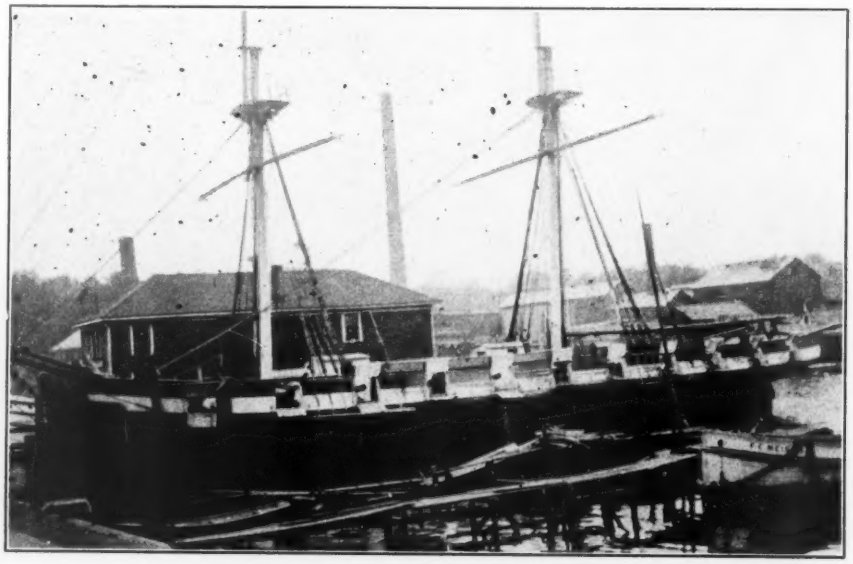
The policy of buying and protecting forest lands fell into disuse when iron ships seemed to be about to do away with wooden vessels. The promise was not fulfilled, as the present war has emphasized. The oak land acquired as a ship timber reserve nearly all passed out of the government's ownership in the years following the advent of the iron ship; but a little of it remains in Florida and is included in the National Forest there.

The "knee" is an essential in building the wooden ship. It is shaped like a crude capital L, and the bend suggest the name knee. It is a brace inserted in the angle where two timbers join in the framing near the bottom of the vessel. The braces are hewed or sawed from trees, a section of the trunk and the attached limb or root constituting the knee. Sizes vary. Large ships require huge and strong knees; other vessels take those of smaller size, while very small knees are sometimes used in boats which are little larger than big skiffs.

Many kinds of trees produce growths suitable for knees, but all do not. The wood must be strong and durable. The largest and strongest knees are those hewed from southern live oak. Douglas fir is a valuable knee wood, and for small and medium-sized vessels much use is made of tamarack roots. This is the same tree that furnished roots as threads with which Indians sewed patches on their bark canoes. When the tamarack tree grows in the soil which it seems to like best, that is, a filled swamp with a soft soil a couple of feet deep above and a stratum of hard clay below, its roots take on a peculiar form. The root strikes straight down through the soft soil to the clay, and not being able to penetrate that, the root turns at right angles and follows the surface of the clay, thus forming the crook which becomes the knee.

All wood used by shipbuilders does not consist of heavy timbers. Doors, window frames, and inside finish of many kinds must be provided, much as is done in land buildings; and the kinds of wood used are not much different from those on shore. The iron ship needs wood finish in amounts depending upon the kind and size of the ship.

Our forests provide few woods suitable for the large pins with which ship timbers are fastened together. The pins are known as treenails and they vary in length from one to four feet and in diameter from a little less to a little more than an inch. Very hard and strong wood is demanded and it must possess small tendency to shrink and swell. Oak does fairly well if carefully selected and prepared, and a little red eucalyptus from California has been used on the Pacific coast, but the best is black locust. This tree's native range lies along the middle Appalachian Mountains and in the adjoining region east and west, though locust has been planted and it grows in nearly all parts of the United States. The manufacture of locust treenails by farmers and lumbermen was a paying business, on a small scale, until iron ships largely displaced wood. When we began building wooden ships to fight



COMMODORE PERRY'S FLAGSHIP NIAGARA

This relic of the war of 1812 was sunk in the Battle of Lake Erie in which the Americans won a signal victory over the British. The vessel was recently raised and is now one of the show objects at Erie, Pennsylvania. It was built of green timber cut on the lake shore and is in a good state of preservation.

Germany in 1917, the locust treenail came into larger use than ever in the past.

In building the war vessels constituting the first American navy, much locust was used for stanchions, braces and posts, the wood being so extraordinarily strong that small pieces were sufficient. In the War of 1812 American ships won victories in rapid succession over British vessels of equal or larger sizes, and an English naval writer gave it as his opinion that the superiority of the American gunnery was due to the locust wood in the ships. Small stanchions and braces took up less of the precious space and gave the gunners more elbow room in serving their guns, and it may have had something to do with the markmanship that won victories.

FOREST OPPORTUNITY ON PINE LANDS IN THE SOUTH

BY F. W. BESLEY

STATE FORESTER OF MARYLAND

THE South is the land of opportunity. A favorable climate, abundant rainfall, suitable soils, and a long growing season make it admirably adapted for growing crops. About fifty per cent of the land area is in forest, which points to the growing of timber as one of the most important crops of the South. Yet, with all these natural advantages, there is a vast area of idle land, and this area is increasing rather than diminishing. In these days, when increased crop production is demanded, it is of the greatest importance to devote all lands to their most productive use.

The three important uses of the land of the South are for agriculture, for forestry and for grazing, and the sooner a classification of land is made on this basis, the better it will be for all concerned. The area in farm crops is certain to increase and much cut-over land, now classed as forest but in an unproductive state, will come under the plow. There is, however, only a small percentage of this forest land that will be needed for many years to come, and the great bulk of it will probably remain in forest indefinitely.

The present uncertainty of future use injects an element of chance and speculation into the problem that seriously interferes with a permanent solution. In the mean time, awaiting a permanent classification of the land, it would be possible to grow another crop of timber on most of it to the great advantage of the country, and certainly without detriment to the land.

It is unfortunately true that no great amount of interest in growing timber can be secured in a section where there remains any considerable amount of the original forest. The statement was made by the Secretary of the Southern Pine Association at a meeting of Foresters in Jacksonville in January, 1919, that the large Southern pine operators at the present rate of cutting expected to be "cut out" in ten years. This may be reasonably assumed as practically ending the supply of virgin growth pine timber. After that the timber supply of the South will be dependent to a very large measure at least upon the second growth.

While the rapid disappearance of the original pine forests of the South, which have been the chief source of wealth, is somewhat appalling, it is not altogether an unmitigated evil. The business of exploitation by those who see no future value in the lands will eventually be succeeded on a large part of the pine area by the business of timber growing on a basis of sustained yield.

There is no other part of the country that is better adapted for timber growing than the South. The most favorable conditions exist. Cheap lands, the best native species, rapid growth, combined with excellent transportation facilities and the possibility of developing important local wood-using industries, render conditions almost ideal.

The day of cheap timber is rapidly disappearing, just as rapidly as the disappearance of the original growth. The price of timber will be measured by the cost of growing it plus a reasonable profit. We are now passing through the transition stage from unrestricted timber exploitation, with a disregard for the future, to timber growing on a permanent basis, with a certainty of adequate returns on the investment.

There will be much changing in the ownership of land, and it will take many years to effect the readjustment, but it is certain to come, and with it a feeling of security of investment and enterprise that has never existed before.

The forests of the South have been the chief source of timber supply for more than two-thirds of the population of the United States for many years. The exhaustion of the original forests is not only going to remove a chief source of wealth to the South, but is going to have a far-reaching effect in the country at large.

A large part of the pine lands were acquired, and are still held, by lumber companies, whose chief concern has been, and still is, to cut and sell the timber and afterwards sell the land. After the timber is cut off, the land has little, if any, sale value, and consequently most of it is still held by the lumber company owners.

Under private ownership, the cut-over lands have been practically non-productive, partly because the owners could see no profit in a second crop, and partly because of the impossibility of protecting these lands against fires, so that reproduction could be secured. Little can be hoped for through private ownership under present conditions, and it is not likely that much can be expected from private initiative for many years to come.

It is manifestly the duty of the State to lead the way and to place timber growing in the South upon a permanent basis. Every State in the South should have a Forestry Department, organized for administrative and scientific work. Several of the States have already taken

this step. Each State should acquire and place under the management of its Forestry Department large areas of forest land, upon which to demonstrate the principles of applied forestry. Cut-over pine lands can be acquired at low cost, and, under the favorable conditions existing in the South, it should be possible to clearly and convincingly demonstrate the practicability of handling them for profitable timber production. This program will give to the State a definite problem to solve and a definite forest policy to follow. It would give the Forestry Department a stability and a permanency that does not now exist, and would enable the State to demonstrate the best methods of handling forest lands for timber production. Forest fires, which are today preventing forest growth, must be brought under control. It has been demonstrated that fire in specific cases is an aid to reproduction, but it must be absolutely under control and used at the right time by those who know how to use it to aid the forest, and not left to the cattle raisers to scatter promiscuously for the destruction of the forest. The solution of the fire problem is, in a large measure, the key to the whole situation, and is one that must be worked out through much trial and tribulation. It is on large areas of State-owned land, where fire protection can be practiced without interference on a large scale, that the fire problem can best be worked out in a convincing way. Until that is done and public sentiment reconstructed timber growing as a business will not make progress.

WASHINGTON'S FIRST MEMORIAL TREE

THE first memorial tree planted in the Nation's Capital was in honor of the men from the United States Department of Agriculture, who gave their lives for their country. It was a white oak set out on the spacious department grounds, with Secretary Houston and Mr. Henry S. Graves, Chief Forester, both of whom are vice-presidents of the American Forestry Association, as chief participants in the simple ceremony. The various bureau chiefs and other officials of the department were present at the planting.

"Many members of our department," said Mr. Graves, "gave up their lives in the great war. We will not forget the part they played in that struggle, nor their sacrifice. We shall pay tribute to their memory in divers ways.

"Today we are planting a tree for them. Nature will build from it a living monument. Every year it will strike its roots deeper, raise its crown higher and spread its branches wider. It will grow in stature and strength, like our own appreciation of the devotion of the boys who gave all that their country and the world might be a better and happier place to live in."

Photograph by Harris and Ewing

PLANTING WASHINGTON'S FIRST MEMORIAL TREE

FORWARD WITH TREE PLANTING

BY CHARLES LATHROP PACK

PRESIDENT, AMERICAN FORESTRY ASSOCIATION

"He who plants a tree,
He plants love.
Tents of coolness spreading out above
Wayfarers he may not live to see.
Gifts that grow are best;
Hands that bless are blest.
Plant! Life does the rest."
(From poem "Plant a Tree," by Lucy Larcom.)

IF YOU or your city have not joined the army of those who are planting trees, enlist now! With the growing interest in this movement, do not allow yourself or your community to lag behind. It is one of the most important pieces of reconstruction work in the United States in which you should have a part; in fact, it is a work which should be continuous and grow with the passing.

There is no reason why this should not be so. The interest which has been aroused in tree planting throughout the country should be maintained. The added impetus which has been given to this worthy enterprise by the suggestion of the American Forestry Association that trees be planted in honor of America's soldiers and sailors, both as memorials to the dead and as tokens of appreciation to the living for their offer of service, should not be allowed to die. It should be but the beginning of a great forward-sweeping desire and determination on the part of the people of America to see their cities and parks beautified with handsome trees, their roads and avenues shaded and strengthened and their forest resources enriched through a deepening and broadening of conservation methods and efforts. A patriotic chord was struck by the memorial tree-planting idea. It made an appeal which has been nation-wide; and in hundreds of places throughout the United States it has been carried into effect or plans are being made for its adoption either as a separate proposition or in connection with some other memorial being erected.

A MOST ORNAMENTAL TREE

The cone-shaped cypress with its graceful, light-green foliage is considered one of the finest trees that can be planted for decorative purposes, and is widely used throughout the United States.

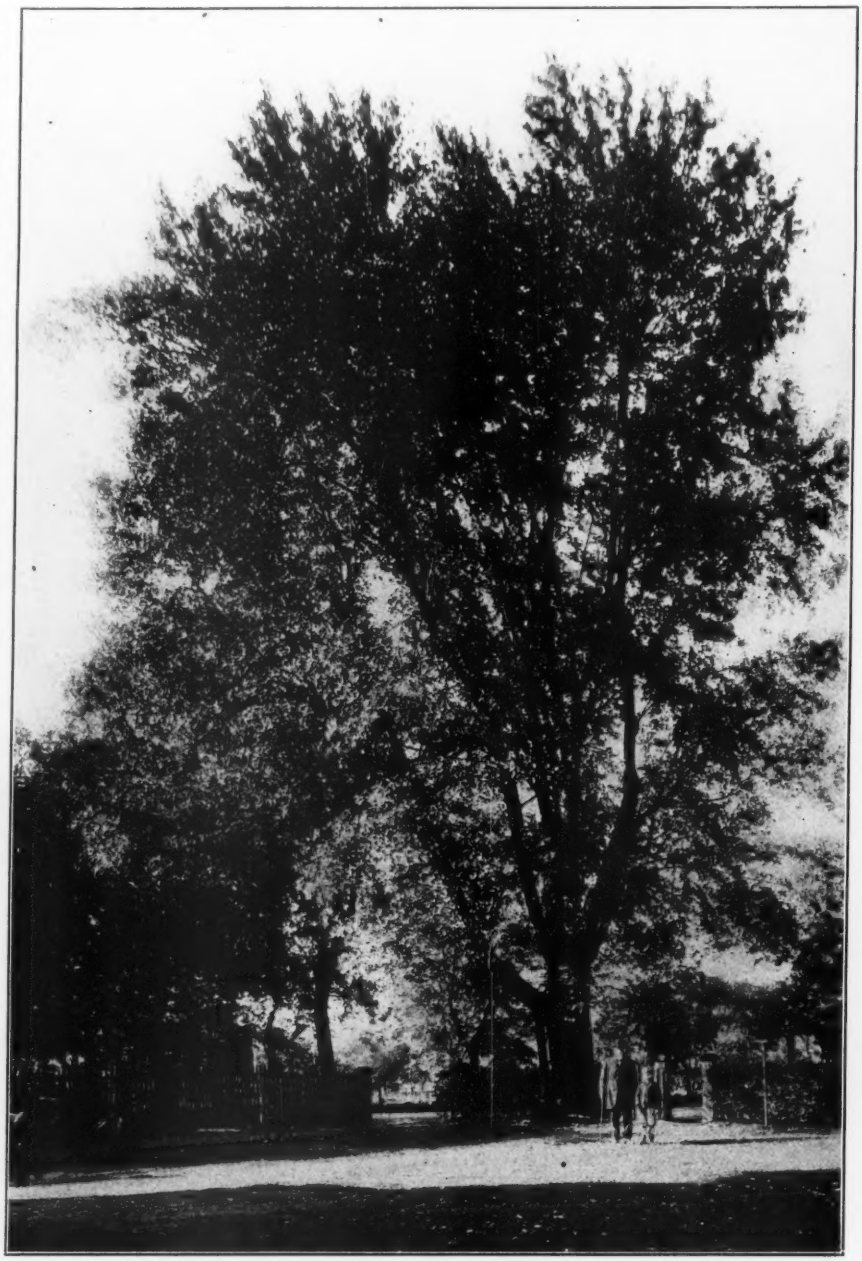
One of the big plans which has been suggested and which would fit in closely with that of the American Forestry Association, is that advanced by Col. Webb C. Hayes, the son of a former president of the United States. Colonel Hayes was chairman of the Cuba-China Battlefield Commission of the War Department which was charged with the marking of graves of American soldiers who died in foreign service, and who has recently returned from France where he served as regional Commissioner for military labor.

This would provide for a county unit system of placing memorial tablets to the men who gave their lives for their country. These tablets would be placed on the county courthouse or on memorial highways extending from county to county, preferably at the points where these roads enter adjoining counties. Then the plan for setting memorial trees along these roads would be pushed. This would lead to the building or improvement of thousands of miles of roads in the United States and to the planting of many miles of fine trees, which would be an inspiration to other effort in this direction at the same time that it was serving as a daily reminder to the people of America of the blessings of democracy for which their sons and brothers had fought and died. Colonel Hayes believes also that the idea could be extended to France with a memorial highway marked by trees extending from Paris to a number of the battlefields where America's sons won undying honor.

Before leaving Europe Colonel Hayes cabled to the Chamber of Commerce at Fremont, Ohio, his home town offering to provide the tablets for the men from Sandusky County; and William G. Sharp, former American Ambassador to France, did the same thing for Lorain County. During the past session of Congress a bill was introduced by Representative Sherwood, of Ohio,

although unfortunately it was killed in the rush of other business, which provided for the appointment of a commission to carry out the ideas of Colonel Hayes.

Large cities and small towns all over the United States are showing their approval of the memorial tree idea by putting it into practice. The story of what some of them are doing is an inspiration to others. Almost since the day of the signing of the armistice the question of memorials has been a subject of public discussion in nearly every city and town throughout the country. It was recognized at once that every place would desire to honor in some permanent manner the service rendered by those who had died or had offered their lives for their country. In this discussion there was one insistent note, heard time and time again. This was that the memorial should be worthy. There was frequent expression of the opinion that there should be no repetition of some of the "atrocities" which had been erected in "honor" of heroes of former wars. The spirit which was back of these, it was acknowledged, had been patriotic and worthy of highest praise; but the outward expressions in many instances, it was declared, had been anything but ornamental and had therefore been the subject of frequent criticism. Of tree planting editors and others throughout the country have had nothing but words of praise. It is most gratifying that this should be so.



A FINE OLD SUGAR MAPLE

This is one of the most popular trees for planting. For city streets the Norway maple is to be preferred to the sugar variety, except on wide streets with parking. The noble specimen here shown stands in Howard County, Maryland.

In a letter which Vice-President Marshall has written to the people of Collamer, Indiana, in his own home county, the story of whose tree planting appeared in last month's issue of AMERICAN FORESTRY, there is well epitomized the sentiment which has been stated in other words by hundreds of other people. The Vice-President said in part:

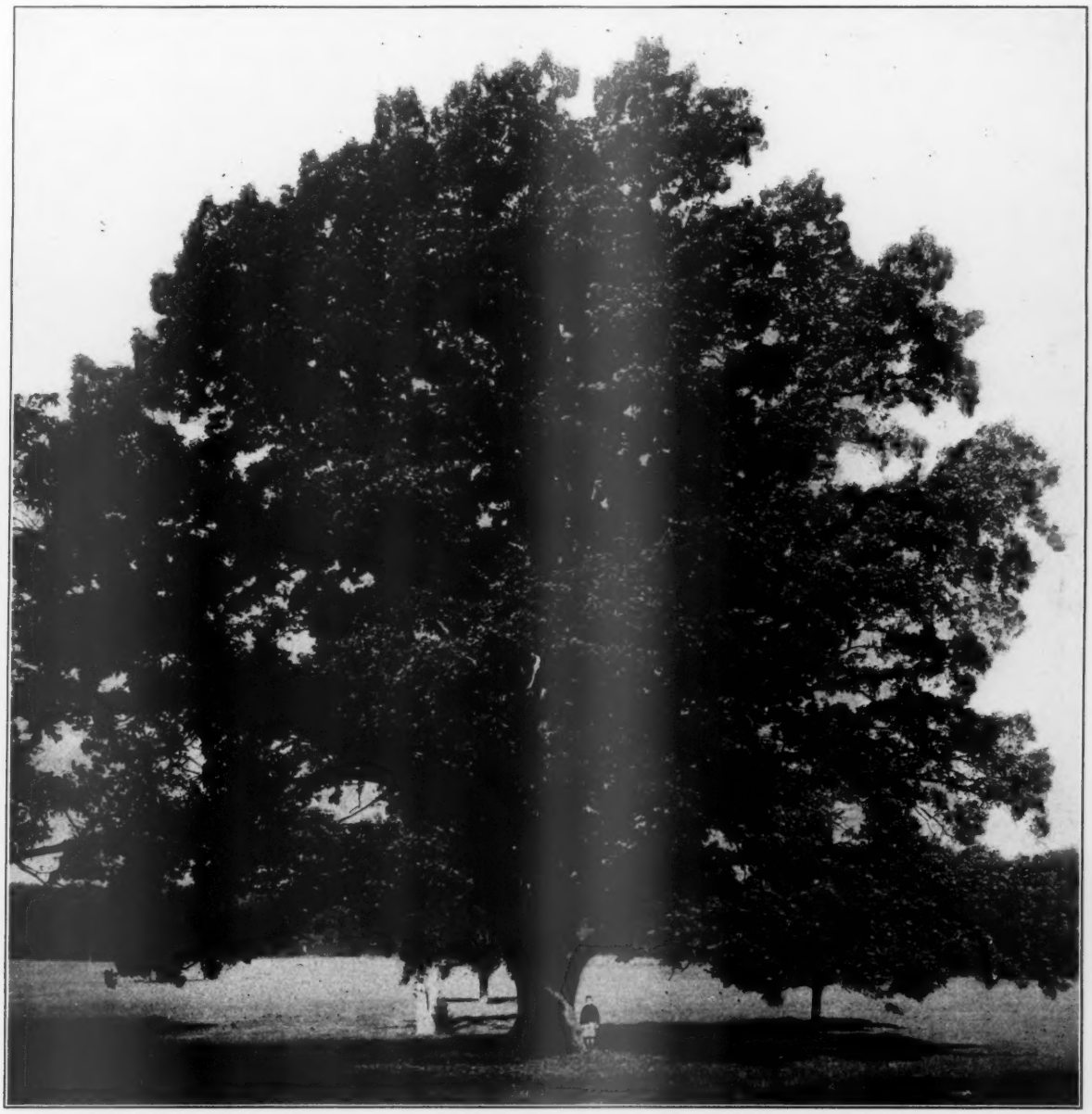
"The idea appeals to me far more than storied urn or animated bust. It embodies a living thing, representative of a vital sentiment of the American people and I hope it is going to be universally popular in America."

One of the most active of the larger cities of the United States in the memorial tree campaign is Philadelphia, already noted for its spacious Fairmount Park with many acres of beautiful trees and for a comparatively large number of trees which it now enjoys along many of its streets and in its suburbs. There the committee on municipal art and tree planting of the Civic Club and the Society of Little Gardens, are leading in the movement to plant what they call "Tribute Trees." They will work in co-operation with the Fairmount Park Com-

mission which has charge of all tree planting in Philadelphia. Individuals who do not care to plant a tree of their own are invited to join with some community group in placing such memorial. The United States Marines were among the first to ask permission to participate in this patriotic undertaking; and they desire to plant a whole avenue of trees. The members of the Civic Club committee which is interested in the movement are Mrs. Howard W. Lewis, chairman; Mrs. Henry Wolf Bikle, secretary; Mrs. Edward W. Biddle, Mrs. Leon T. Ashcraft, Miss Mary Blakiston, Miss Sophia Cadwalader, Mrs. Charles Davis Clark, Mrs. L. Webster Fox, Mrs. Rodman E. Griscom, Mrs. Roger W. Griswold, Mrs. Charles W. Henry, Mrs. Edward Stotesbury Lewis, Mrs. J. Howard Rhoads, Mrs. John Frederick Lewis, Mrs. W. Beaumont Whitney and Mrs. F. A. Rakestraw.

In a recent communication, published in a local paper, John R. Johnson, superintendent of parks, Passaic, New Jersey, said: "We are too apt to look upon trees in a more or less matter-of-fact way, as something Providence has fully provided for and of which there can be no end. It seldom occurs to our mind that the pleasure we received, and the comfort enjoyed from their presence, is in great measure attributed to the forethought and activities of generations long since passed away."

They are now erecting monuments in Ohio to "Apple-



A FITTING MEMORIAL TO STRONG DEEDS, FOR IT IS THE "SYMBOL OF STRENGTH"

Mention of the word oak brings to mind the thought of long life and endurance. As a family the oaks are undoubtedly among the best of shade trees, for they are beautiful, long lived and little subject to disease or insects. This monarch white oak is in central Maryland.

Seed Johnny" whose name is now a household word throughout the state because of the fact that this erratic knight errant of the road traveled hither and yon sowing the seed of tens of thousands of apple trees whose fruit he was never to enjoy but which have proved a great boon and a valued possession to others. That is the true spirit of the planter. He thinks of the future and of the enjoyment and blessing which will come to those yet unborn from the seed which he sows or the tree which he plants.

Similarly the future will rise to call those blessed who today are adorning our parks and avenues and the coun-

AMERICA'S MOST POPULAR TREE

It can be truly said that no other tree holds as high a place as the American or white elm. It is the most aristocratic of all the nation's shade trees; and is almost if not quite as beautiful a feature of the winter as of the summer landscape.

try's highways with handsome ornamental trees. Many of these will have a utilitarian value in and of themselves; but their greatest value from the economic point of view is likely to be the interest which they arouse in practical forestry, in conservation and in encouraging a more thorough and nation-wide study in the subject of timber resources. This is a matter which will become of greater and greater importance with the advance of our civilization and the increase of population not only in the United States but in other countries. The children will be taught the value of tree life because they will participate in the ceremonies incident to the plantings. They will know and come to appreciate more and more as they grow older the purpose for which this work was done. They will know it was because their fathers and their elder brothers were looking to the future welfare of mankind; and the lesson will impress its deep meaning on them.

The American Forestry Association is anxious to have its members interested not only in tree planting in this country but in the help which is to be extended to Great Britain, France and Belgium in restoring their badly cut or devastated forest areas. Percival Sheldon Ridsdale, Executive Secretary of the Association, who went abroad early in the year to investigate the amount of damage done and to ascertain what assistance might be given, reports on his return that about one and one-half million acres of forest land in France has either been destroyed by shell, machine gun and rifle fire or by the cutting by the contending armies for barrack, trench and fuel wood; that practically all of Belgium's forests having any timber value had been cut down by the Germans and used or shipped back to Germany; that fully 450,000 acreas of Great Britain's forests had been felled.

The forest authorities of each of the countries named have declared eager to have the assistance of the American Forestry Association in providing them with American forest tree seeds. This help is to be extended and the work will be carried on this year and in 1920.

There are many ways in which the people of the United States can have the subject of tree planting kept before them. Those who have the subject at heart should help in various ways to keep this topic to the fore. At the present time there seems to be no better way, no method that will call forth a more popular response, that by making it a memorial to the soldiers. But then there

A DESIRABLE SHADE TREE

Under favorable conditions the white ash grows fairly rapidly and attains a good size with a moderately broad open crown and thin foliage. It is native to a wide territory throughout the United States.

are other persons and events that can be memorialized, and most fittingly, in this manner. The American Forestry Association has suggested that trees be planted in honor of the late Colonel Roosevelt along highway to be named for him and elsewhere; and this is being done in a number of instances. There are other lovers of nature, men who through their written or spoken words or in other ways have taught the beauty of woods and trees and flowers; and to all such trees might appropriately be planted. One such was Walt Whitman, the

centenary of whose birth will be celebrated on May 31 next. Many others will be found, some of national, others merely of local renown, who are worthy of tribute of this sort from their fellow-citizens.

In order to secure the best results it is necessary that there be as widespread interest as possible in the work. What a majority of the people in a community want done, or even a much smaller band of enthusiastic workers, usually is done. Is there a local forestry improvement association in your neighborhood? If so help to make its work successful by action. If there is no shade tree commission, no city forester or other organization interested in this vitally important subject, interest yourself in the formation of such an association. In any community, whether it be large or small, there should be co-ordination of effort to secure the best results in shade tree planting and care.

In selecting trees for street planting the following qualities should be considered in about the order named: form, hardiness or adaptability, rapidity of growth, shade protection, neatness and beauty. At best a tree on a city street is somewhat at a disadvantage and so some care should be used in selecting the best variety for the particular locality and then they should be planted carefully and well cared for. Trees are beautiful or otherwise as they harmonize with their surroundings. Those that will look well on a narrow street may not be suited for a wider street or a broad avenue. If there is any doubt on the question it is advisable to consult the state forest commission, the local forester or some other authority who can tell what varieties are best for a given locality. Of course, no general rules could be given for the entire United States, or even for a major portion thereof; but in a larger part of the eastern United States it will be found that for narrow streets the red maple, red gum or ginkgo can be recommended for narrow streets; for wider streets, Norway maple, basswood, horse chestnut or pin oak; and for wide avenues, white elm, white oak, red oak and tulip poplar.

Street trees should have hardiness and adaptability. They should be vigorous, be able to recover from mechanical injuries and be as non-resistant as possible

THE LARGEST BEECH IN MONTGOMERY COUNTY

That is the boast which this tree can make. It is 10½ feet in circumference with a spread of 90 feet. It casts too heavy a shade for street planting, but makes a beautiful lawn tree. The one shown here is in Chevy Chase, Maryland, not far from the District of Columbia line.

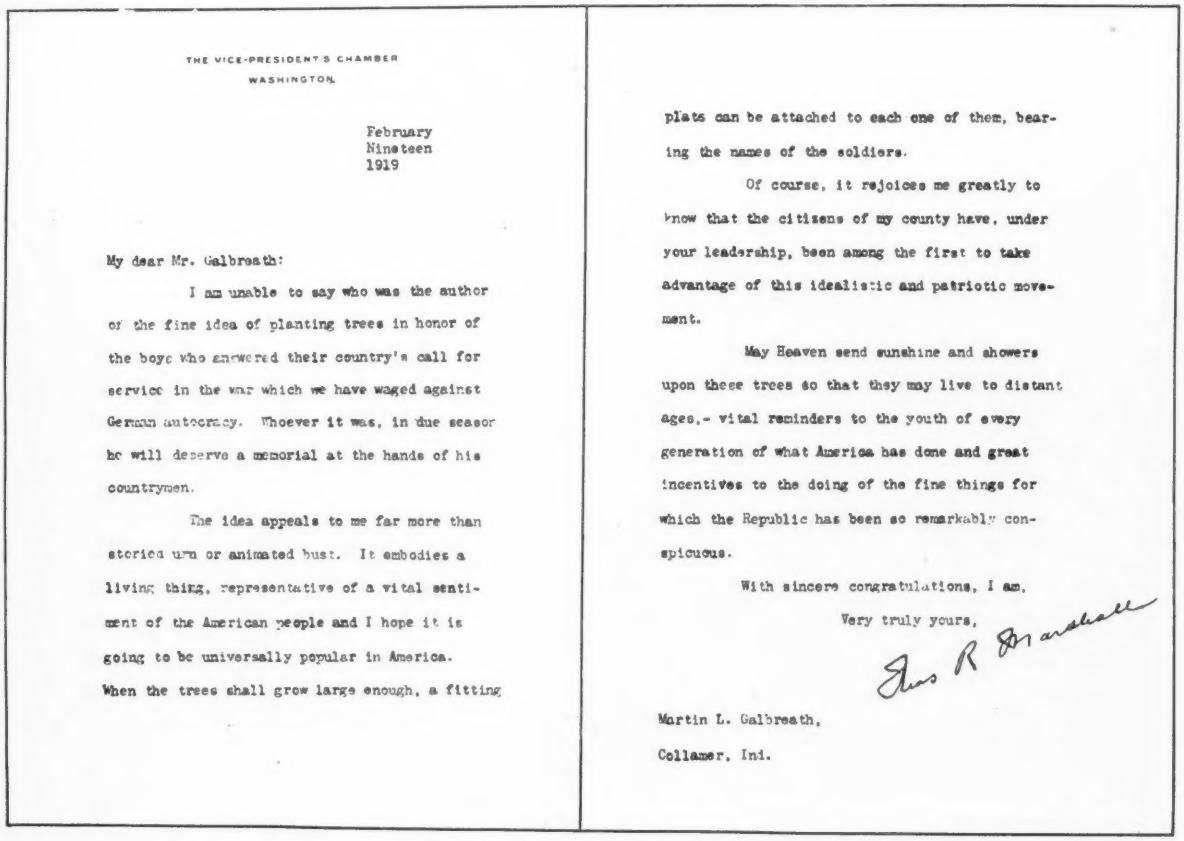
against insect attack and disease. While quick growing trees are desirable in some ways it must be remembered that such varieties are likely to be the shortest lived and will have to be replaced sooner than those of a somewhat slower growth, which with good care can be made to develop more rapidly.

It is not desirable to have trees which cast too much shade, particularly on narrow streets. Houses and sidewalks need sun even in summer. Again the question of neatness ought to be considered; and trees which will break up the pavement, such as silver maples, or those which cover the pavement with their bloom in the spring, such being cottonwoods and poplars, ought to be avoided. Evergreens are not suitable for street planting because their shade is not wanted in winter. Black locust should not be planted because it is likely to be destroyed by the borer worm. Beech is a slow grower and casts too dense a shade for any street.

There are several points to be taken into consideration. Trees planted along a street should be of the same kind, the same size and uniformly spaced. On narrow streets trees planted every forty feet apart, and alternated on opposite sides of the street, will be found sufficiently close; and on wider streets they should be from forty to sixty feet or even farther apart, the distance being determined partly by the size which the tree is likely to attain and other habits. Every tree should have at least six square feet of earth above its roots. It is more important that there be plenty of space where the pavement and roadway are paved with concrete than if brick or other loose-jointed material is used.

In planting a tree move as many of the roots as possible. A cloudy day is better for transplanting a tree than a bright sunny one because a bright sun quickly exhausts the stored up moisture. An important point is in regard to packing the earth around the roots. They should have close contact with the ground, because a tree feeds through its roots, and therefore every smallest rootlet should be firmly in the ground. To do this fill in around the roots with finely pulverized earth, working it under and around the roots by hand and compacting it. If the earth is wetted down as it is put in it will make a much better contact. It must be remembered that trees cannot take care of themselves. They need food and they need attention and so provision should be made for their nourishment and to see that they are properly protected against insects and other pests and against damage from other causes.

Tree planting should form a permanent part of the improvement program in every city and town in the United States. It should not be undertaken in a temporary, haphazard manner; but should receive the constant thought and attention of those who are interested in making the community more attractive and at the same time in adding to the future timber resources of the United States. It must be remembered that what is done in one city or town serves as an inspiration to others; and that the habit once formed of setting out a number of trees every year will become fixed and will extend until it covers the nation.



THE VICE-PRESIDENT'S CHAMBER
WASHINGTON

February
Nineteen
1919

My dear Mr. Galbreath:

I am unable to say who was the author of the fine idea of planting trees in honor of the boys who answered their country's call for service in the war which we have waged against German autocracy. Whoever it was, in due season he will deserve a memorial at the hands of his countrymen.

The idea appeals to me far more than storied urn or animated bust. It embodies a living thing, representative of a vital sentiment of the American people and I hope it is going to be universally popular in America. When the trees shall grow large enough, a fitting plate can be attached to each one of them, bearing the names of the soldiers.

Of course, it rejoices me greatly to know that the citizens of my county have, under your leadership, been among the first to take advantage of this idealistic and patriotic movement.

May Heaven send sunshine and showers upon these trees so that they may live to distant ages,- vital reminders to the youth of every generation of what America has done and great incentives to the doing of the fine things for which the Republic has been so remarkably conspicuous.

With sincere congratulations, I am,

Very truly yours,

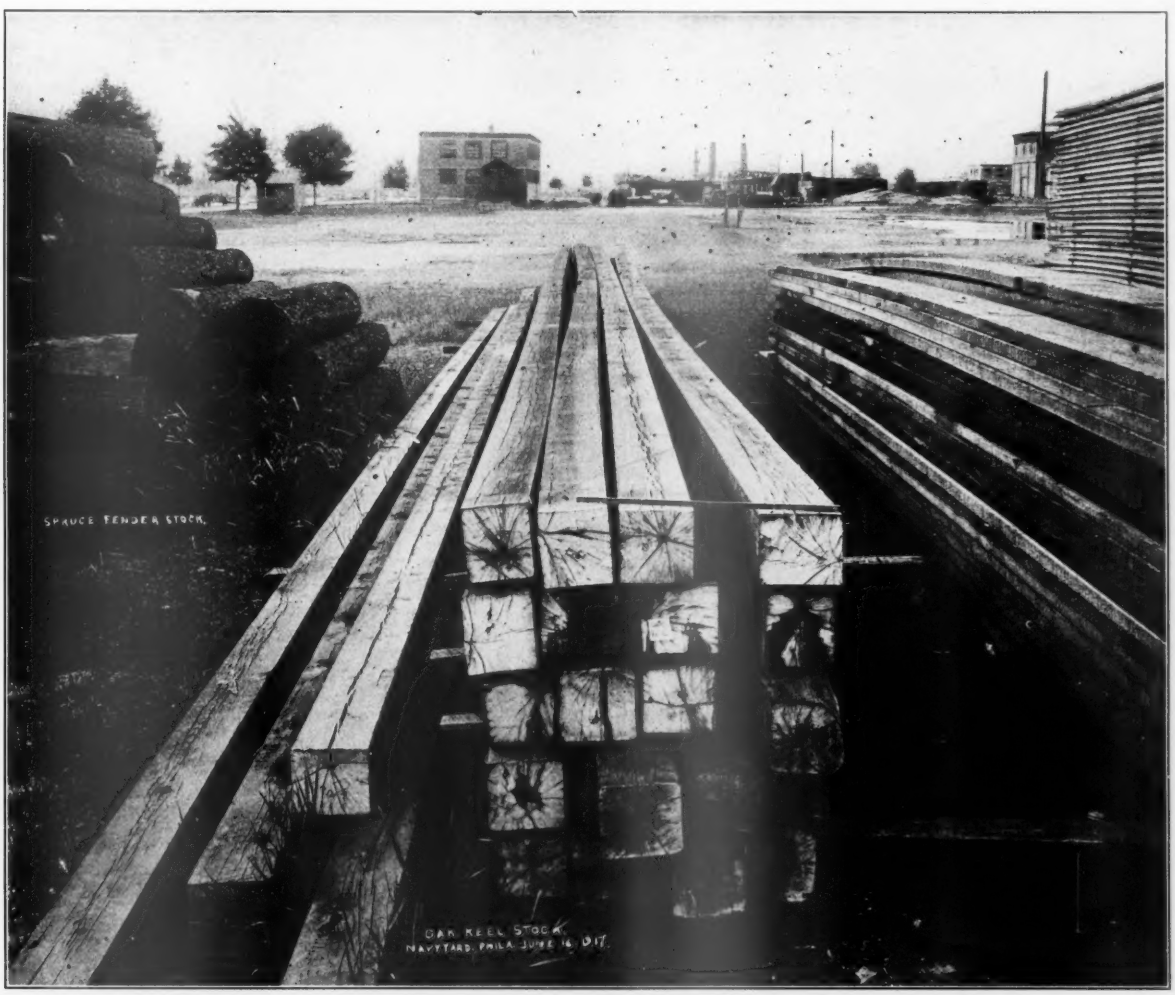
Thos R Marshall

Martin L. Galbreath,
Collamer, Ind.

WHY WOOD IS BEST

BY ALFRED GASKILL, STATE FORESTER OF NEW JERSEY

NO one thinks of building a battleship of stone, or a bridge of copper, or a cabin of steel. The qualities that determine the fitness of most structural materials are generally known; the inherent qualities of various woods, which make them valuable for specific purposes, rarely are recognized. Wood substance, or cellulose, is much the same in all kinds of wood, but a great diversity in the form and arrangement of the elements produces a wide range of values. Practically every species has a characteristic structure, though it varies with the individual.



SPRUCE FENDER STOCK. OAK KEEL—AT THE PHILADELPHIA NAVY YARD

But though wood in general must be recognized as a material of great variability the constants in each species give positive advantages for many purposes. The truth of this depends upon the fact that fitness for service increases (1) with uniformity of structure and absence of defects (knots, cracks, crooked grain, etc.); (2) with reduction of the moisture content. The first requires a selection of the material more or less vigorous according to intended use; the second involves "seasoning," by storage or by artificial means, until the wood is "air dry." Fortunately it is now possible to know the real qualities of most of our commercial woods and to choose what is fit with only a guiding reference to old customs and preferences.

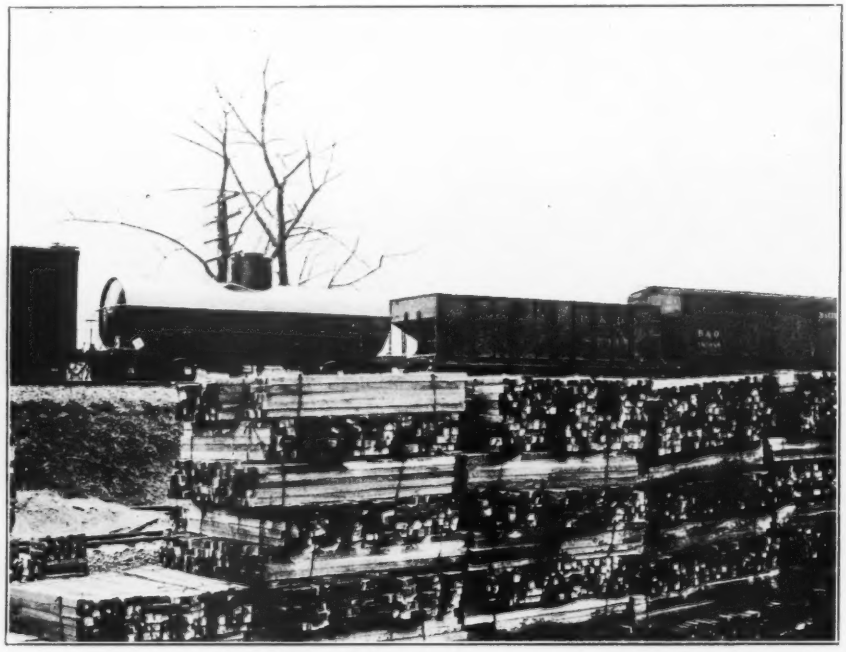
For engineers there have been constructed elaborate tables showing the resistances of all our principal woods to bending loads, compression, tension, shearing, indentation, etc.; the non-technical reader will be better satisfied with general statements.

The user of wood is apt to define its qualities by means of terms which mean quite definite things to him, but which really are relative, or are capable of various interpretations. For any important purpose it is advisable

to find the wood that furnishes the greatest total of desirable qualities *when air dry* as excess of moisture constitutes a defect. Quantity and availability often are decisive factors.

Strength is a term that is often loosely used to indicate the power of resistance to a strain without reference to other qualities, as weight, toughness, stiffness, etc. Thus hickory and white oak are strong to sustain a load, but in a beam may be less serviceable than longleaf pine or Douglas fir because the latter are stiffer. Pine on the other hand makes a poor hoe handle because it is comparatively brittle; oak is better but is apt to become bowed and is too heavy; ash is best because it combines sufficient strength with stiffness, flexibility and moderate weight. Another sort of strength is that which resists shock and "shear"—the qualities required in a hammer handle, an ax helve and a wheel spoke. For such use no wood known answers so well as young, quickly-grown hickory.

Durability as descriptive of wood quality is even more loosely used than "strength." Most of those who deal with woods in a technical way understand it to be the quality which resists decay. When kept perfectly dry, or when entirely immersed, any kind of wood lasts indefinitely, but if exposed to warm air and moisture it behaves quite differently. Poplar, beech, maple and most pines decay so quickly in contact with the ground that they are unfit for use as fenceposts, telegraph poles, railroad ties, etc.—they are not durable. Other kinds, as black locust, red cedar, black walnut, chestnut, will last for many years under similar conditions.



READY FOR SHIPMENT

Black locust squares 1½ x 1½ in. by 12 in., 20 in., 24 in., 32 in., 36 in., 40 in., 46 in., long to be shipped for treenails. Keyser, West Virginia.

For many purposes the greatest value is found when durability is combined with other qualities. Black locust or white oak makes a good railroad tie, for instance, because it is hard to resist the cut of the rail as well as durable to withstand decay; a bridge sill must be strong to carry a load, hard to endure wear, and durable to resist decay.

SUGAR PINE SHAKES

This picture was taken in the Sequoia National Forest, California.

Within recent years durability has lost much of its practical importance through the development of processes by which non-

durable, or perishable, woods are made very durable. Thus by treatment with creosote, zinc chloride, etc., the hard but perishable beech and maples provide

THE STOCK DRYING ROOM

Showing oak and hickory spokes and elm hubs, at Oakland, California.

railroad ties of longer life than untreated white oak.

Toughness is the quality by which shocks and irregular strains are withstood. It is the opposite of brittleness and differs from strength and hardness. The classic example of toughness is a well-made wagon wheel. The hub of elm resists the strain of the spokes; the spokes of hickory carry the twists of traffic, and the mortised ends do not shear; the felloe of hickory or ash maintains its shape against every deforming force. Hickory, white oak, white ash and rock elm are all tough woods. By combining toughness with elasticity and relatively light-weight white ash stands above all others for farm implement handles, for vehicle frames, and now for the structural parts of airplanes.

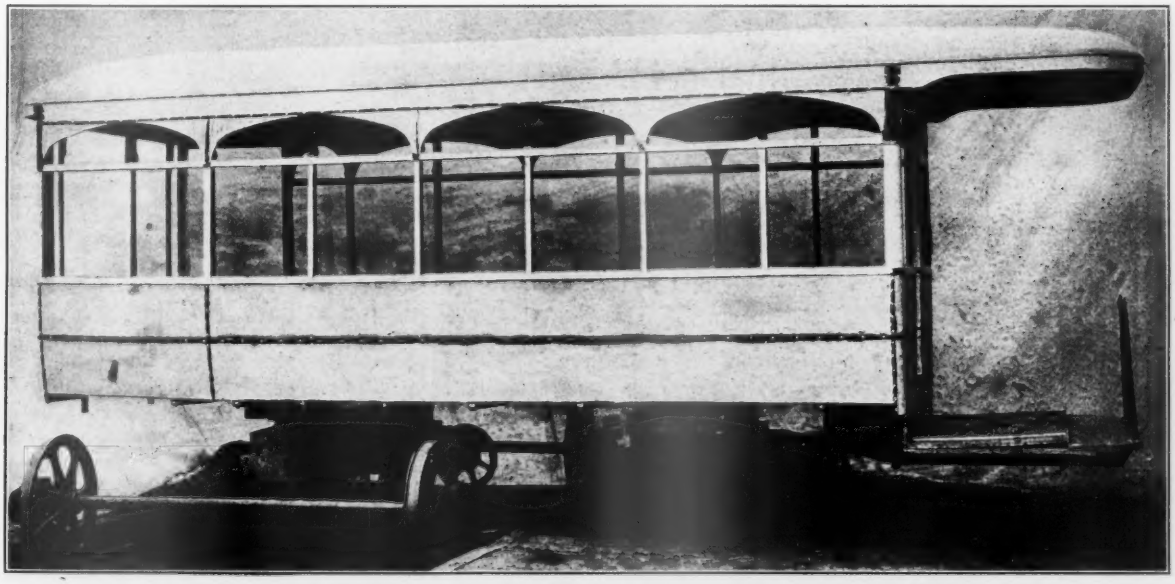
Brittleness is usually a negative quality; it may be positive when a fracture is short and produces no long splinters as tough wood when broken always does. It is one of the qualities that make black walnut the preferred wood for gun stocks.

Elasticity is the property of recovering an original shape after deformation, and is usually a most valuable

PRESERVATIVE TREATMENT

Brush treatment of telephone poles, showing method of application.

quality. Oak makes a poor wagon tongue because it is only moderately elastic and is apt to bend and stay bent; but it makes a fine ship knee because it is hard and strong, as well as tough and flexible, and when



THIS IS THE BODY OF AN AUTOMOBILE BUS

White ash was used for the framework and interior finish.

bent under pressure will keep the shape given it. Elasticity is found in flexible woods like ash and hickory and in stiff woods like pine and spruce. A floor beam should be stiff and elastic; a carriage axle should be flexible and elastic.

Flexibility-Stiffness: As an archer's bow so must the felloe of a buggy wheel be flexible, elastic and tough. For the buggy wheel hickory answers best; for the bow ash is chosen because it is lighter and does not "set" so readily. No one would choose a flexible wood for a bridge stringer, or for a car sill, but one which is stiff, strong under a load, durable and not too heavy.

Hardness is of importance when the service required of a wood tends to cut into it, or to wear it down. A railroad tie must resist the cut of the rail; a floor board not covered with a carpet must withstand wear. A door of soft wood is better than one of hard wood because it is lighter and hardness gives it no advantage. The best flooring is "quarter sawed' to show "edge grain" because that face wears better than a common face sawed "through and through." In ordinary carpenter work hardness is a disadvantage as it increases the labor required with no corresponding gain.

WOOD WHICH TWICE OUTLIVED STEEL

White oak tie, side view. This tie was laid in the track during the year 1888. The steel has been changed twice since that time. The ties have decayed but little and will probably serve in a side track for four or five years. Plains, Montana.

Shrinking: The wood that shrinks, or works, least is always preferable. A carriage panel or a table top that shrinks after it is finished will show an unsightly crack unless provision is made to conceal the contraction. Floor boards are made narrow partly to expose the edge grain, but chiefly to neutralize shrinkage. If an eight-inch board shrinks a quarter inch there is an appreciable space between it and the next. If the eight inches are covered by four boards the gap between each is only one-sixteenth of an inch.

Woods differ in this quality according to their structure, and for particular purposes must be chosen with reference to it. But apart from that the moisture content is of great importance. In some species the green wood may contain as great a weight of water as of wood substance. In any species seasoning causes the water to be evaporated and the wood to contract. In general the coniferous, or soft, woods shrink less than the hard, deciduous, woods.

Weight: Our common woods vary from 22 pounds (white cedar) to 53 pounds (hickory) per cubic foot — air dry. Where strong timbers are to be used near the point of production, weight can be ignored. When cost as well as quality must be considered the transportation of a heavy wood handicaps it. But in some cases weight is vital: airplane wings, for instance, are framed of selected spruce because that wood possesses considerable strength and stiffness combined with extreme light weight. Ash likewise is a preferred wood where strength, toughness, elasticity and a minimum weight must be combined.

Other qualities, as *density, tastelessness, etc.,* are sometimes of importance. A tight barrel can be made of white oak, but not of red oak because the latter contains numerous open vessels or "pores." Containers and implements used for food stuffs must be made of wood that imparts no taste. Thus butter tubs and oyster pails are made of spruce, or ash, or maple.

No user of wood doubts that its manifold qualities are advantages rather than faults, since only through them can the forest product, wood, be made to satisfy so many human needs—needs that range from the coarse, solid endurance of a railroad tie, through the soft, weatherproof, roof shingle to the light, stiff and strong wing of the mechanical bird.

One of the members of the American Forestry Association desires to locate a tract of about one thousand acres in New York State, within 150 or 200 miles of Buffalo, for hunting, fishing and vacation purposes. Valuable timber is not essential—cut-over land preferred. Information will be gratefully received and promptly forwarded.—Editor.

MANDRAKES; WILD LUPINE, AND NOTES ON THE AMERICAN SNAPPING TURTLE

BY R. W. SHUFELDT, M. D., C. M. Z. S., ETC.

(PHOTOGRAPHS BY THE AUTHOR)

SO FAMILIAR are the May Apples to every one who lives in the country where they grow, that a detailed description of the plant is hardly called for in this place. Then, too, the illustrations of it as shown in the present article, at various stages of its growth, furnish all that may be necessary to refresh the memory of those who fail to remember this most interesting representative of our eastern flora. It is generally called the Mandrake, or more rarely the Hog Apple, and still more rarely the Wild Lemon. Its generic name in botany is derived from two Greek words, meaning a foot and a leaf; and it is said that one of its earlier names (*Anapodophyllum*), bestowed upon it by Linnæus, carried this idea still further, for it likened the leaf to the foot of a duck. Professor Gray, however, claims that it referred to the "stout petioles," which hardly seems likely. Although Mandrakes may, as a rare thing, come up singly in the woods where they occur—or perhaps only a few together—it is the rule for them to appear suddenly in more or less extensive patches, often covering a very considerable area. Their appearance is quite simultaneous, as is their flowering and, later, their fruiting, to which may also be added their death in the autumn. In the North, the plant is not seen until along in May; while, as we advance southward in the spring, we often find them up in the month of April in the District of Columbia, and still further south very much earlier. It is an abundant species throughout the entire range of the Gulf States, to include large areas in Texas.

Fig. 1. WE HAVE IN THIS PICTURE A VERY BEAUTIFUL EARLY SPRING COMBINATION OF AN OLD JUDAS TREE (*Cercis canadensis*), WITH A PATCH OF MANDRAKES OR MAY APPLES (*Podophyllum peltatum*) BENEATH IT. THIS IS JUST BEFORE THE FLOWERS COME OUT.

Note the flowers of the Judas Tree, how they have blossomed out only on certain limbs of the tree—and that long before the leaves appear. They are bright pink and very conspicuous during the earliest days of spring. This particular tree is well known to many Washingtonians; it is on the right-hand side of the road as we approach the Pierce's Mill bridge.

When the fruit of the Mandrake ripens in the summer, children are extremely fond of eating it, the slightly acid and sweetish taste especially attracting them. By them it is sometimes called the "Umbrella Plant," and for the reason that the leaves "unfurl during April showers." With respect to this Gray says that the "flowerless stems terminated by a

large round 7-9 lobed leaf, peltate in the middle, like an umbrella; flowering stems bearing two one-sided leaves, and a nodding white flower from the fork." (See figures.) Upon first blooming, they are quite fragrant, and the pale green bractlets of the flower buds fall off very early. May Apples are perennial, their rootstocks being after the creeping order, and throwing off thick, fibrous roots; while the fruit, which is really a "berry," is many-seeded,

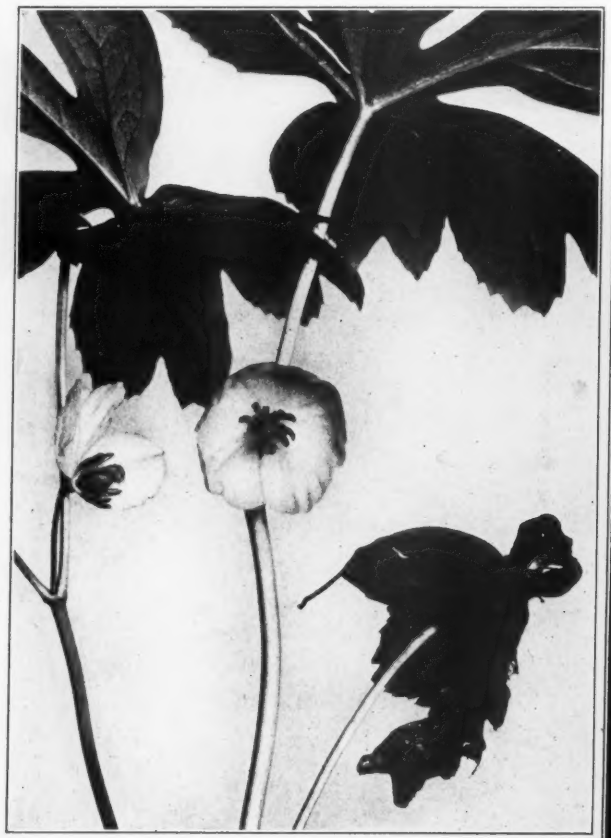


Fig. 2. THIS IS A VERY HANDSOME SPECIMEN OF THE MANDRAKE. SOME OF THE PETALS OF THE LEFT HAND FLOWER HAVE FALLEN OFF, THUS SHOWING THE FRUIT AT ITS EARLY STAGE OF FORMATION

Note on the right-hand side where a leaf has grown through an opening in a dead oak leaf that chanced to cover it on the ground where the mandrake started; it has strangled it, and that plant never came to anything.

and usually grows to become about two inches in length, the form being more or less ovoid or egg-shaped. We often find great patches of these Mandrakes growing in the rich soil on the banks of streams and creeks flowing through wooded areas; but then, again, an acre or more of them may cover some hillside, in a similar soil, where big trees of various species form a belt of timber.

Podophyllum has long been used in medicine as an efficient cathartic and for a few other purposes; however, modern physicians seem inclined to discard it. It belongs, with a few other plants, in the Barberry family (*Berberidaceae*)—in so far as the flora of the northeastern sections of the United States go. Twin-leaf, Umbrella leaf, Blue Cohosh, and Barberry are well known representatives of the same group. All of these occur in the flora of the State of Virginia and in many places this side of the Mississippi River.

The leaves and roots of the Mandrake are poisonous, and children should be cautioned in regard to chewing them. The odor of the flowers is very disagreeable to some people; but then, tastes differ very materially with respect to the fragrance of flowers, and quite a long story might be written on this subject.

Mathews informs us that Mandrakes are never found growing wild in Maine, while the plant is rare in Vermont and New Hampshire; as we proceed further southward it becomes more abundant. Indeed, in the greater part of New England, its place is taken by the well known

Fig. 3. THESE SPECIMENS OF THE MANDRAKE ARE TAKEN *in situ* AT THE FOOT OF AN OLD OAK TREE

The plant in the foreground exhibits the fruit when it is about halfway advanced toward maturity. Other plants nearby had their fruit almost ripe upon them.

Skunk Cabbage, which, it must be believed, is by no means an agreeable exchange.

In the flower world of the eastern United States, we have another most interesting plant in the Wild Lupine, also called Wild Pea and Sun Dial—less often Old Maid's Bonnets. Aside from the matter of color, one may gain a very good idea of it by studying Figures 5 and 6 of the present article. A well-developed plant of this species may grow to become at least two feet in height; and

should twenty or thirty others of similar proportions be in the same group, the whole forms a picture that will live in the mind of the nature lover for many a day—nay, for many a summer to come. Sometimes its flowers are a pale pink, though rarely, and still less often pure white. They have been described as "butterfly-shaped;" but this is a bit far-fetched, as a glance at Figure 6 will prove. In arrangement they form a long raceme on an erect stem; the leaves are of a particularly fine green color, and of a compound arrangement, generally composed of eight or nine leaflets arranged in a circle. When the Lupine fruits, its four or five seeds are contained in a pod of some two inches in length; it is a hairy affair—broad and flat.

Lupine is generally found growing on gravel banks or gravelly hillsides, and sometimes on sandbanks that

Fig. 5. THIS IS A BED OF WILD LUPINE (*Lupinus perennis*) AS IT FIRST COMES INTO FLOWER IN THE SPRING. IT HAS NOT BEEN DISTURBED IN ANY PARTICULAR, SO ITS BEAUTIFUL LEAVES AND RACEMES OF ELEGANT PURPLISH BLUE FLOWERS CAN BE APPRECIATED IN ALL THEIR GLORY

Lupine belongs in the Pulse family (*Leguminosae*)—a very extensive group of trees, shrubs and plants; it even contains the Judas tree, here shown in Fig. 1.

are utterly lacking in moisture. Should they remain undisturbed for several consecutive seasons, and the locality be particularly favorable to the growth of the plant, the group may eventually cover an area of fifty or sixty square feet—a wonderful sight indeed! It has a root that often finds its way into the soil for a distance of several feet—thus the plant is rarely taken up successfully for transplanting to gardens; so it is fortunate that it may readily be introduced through planting its fertilized seeds.

Speaking of its fertilized seeds, Neltje Blanchan has, with marked significance, described how this fertilization comes about in the flowers of the Pea family generally. It is most delightfully put, and she asks, "What is the advantage gained in the pea-shaped blossom? As usual, the insect that fertilizes the flower best knows the answer. The corolla has five petals, the upper one called the standard, chiefly a flaunted advertisement; two side wings, or platforms, to alight on, and a keel like a miniature boat, formed by the two lower petals, whose edges meet. In this the pistil, stamens, and nectar are concealed and protected. The pressure of a bee's weight as he alights on the wings, light as it must be, is nevertheless sufficient to depress and open the keel, which is elastically affected by their motion, and to expose the pollen just where the long-lipped bee must rub off some against his under side as he sucks the nectar. He actually seems to pump the pollen that has fallen into the forward part of the keel upon himself, as he moves about. As soon as he leaves the flower, the elastic wings resume their former position, thus closing the keel to prevent waste of pollen. Take a sweet pea from the garden; press down its wings with the thumb and forefinger to imitate the acting of the bee on them; note how the keel opens to display its treasures, and resume its customary shape when the pressure is removed." (*Nature's Garden.*)

Another interesting fact about wild lupine is that, in common with some other plants, it dozes off after the day is over. The leaves do not change position from an horizontal to a vertical one, as in other members of the legume group, but they twist about on their own axes—sometimes as much as through an entire half arc of a circle. This may be a diurnal trick as well as a nocturnal one—hence the term "sun-dial" applied to several of these

plants. Some of these movements are wonderfully complex, and must consequently mean a great deal to the plant possessing them. In this wild lupine the leaves fold themselves about the stem below, parasol fashion; or the reverse movement may take place, the leaflets extending upwards to close up and in line with the stem that supports them. A number of explanations have been put forth making for a solution of these phenomena; but the subject is too extensive a one to take up in the present connection. It is brimful of interest, nevertheless, and deserves to be carefully and exhaustively studied.

Fig. 4. FULLY RIPE FRUIT OF THE MAY-APPLE OR MANDRAKE (*Podophyllum peltatum*).

Observe how the fruit stems spring from the point of the parting of the bases of the leaf-stems. The leaves themselves are of an elegant green, and the fruit is a rich yellow.

As a matter of fact, the study of the morphology of flowering plants and their physiology is one of the most fascinating lines of research in all nature. When one comes to think of it, the opening and closing of such flowers as our common morning-glories and allied *Convolvulaceae* is an extraordinary phenomenon. That it should take place only at night or on very dark days is a most interesting fact; and that the movement in closing is always in the same direction is another point worthy of close study. What is the necessity for the closing up of the leaves of sensitive plants and trees upon slight pressure from one's fingers, and then opening again in a little while? Why should the species referred to present such a remarkable habit, while it is seen to be entirely lacking in others? Grafting and its results still hold many a secret not yet revealed to science, and the same is true of cross-fertilization. Indeed there is absolutely no end to the list of secrets still to be discovered through researches in structural and physiological botany, by those who devote their time and minds to problems of this nature. Much research work of this class has already been done; and doubtless, when the temporary checks caused by the war shall have ceased to exist, a great deal more will be undertaken.

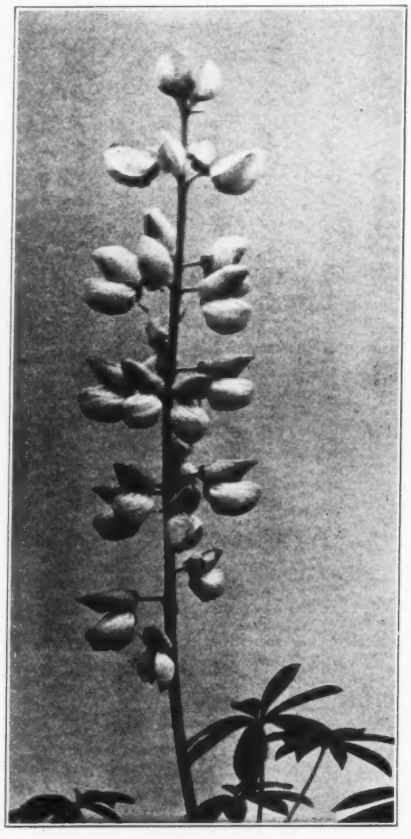


Fig. 6. A SINGLE SPIKE OR RACEME OF THE LUPINE IS ONE OF THE GLORIES OF THE PLANT WORLD DURING THE EARLY SUMMER MONTHS, IN THE REGIONS WHERE IT FLOURISHES

Lupine derives its name from the Latin of wolf, *lupus*, for the reason that superstitious people believe that the plant exercises its power to devour the soil's fertility.

NOTES ON THE AMERICAN SNAPPING TURTLE

To one who has paid any attention at all to our fresh-water turtles, surely the common Snapping Turtle is no stranger. Two species of it is represented in the reptilian fauna of this country, and both belong in the family *Chelydridae*. Of these two forms the smaller occurs, in suitable localities, all over the eastern parts of the United States, and westward to the Rocky Mountains. Southward it ranges into South America, and may be found in many parts of Mexico and Central America, in which latter countries there is still another species which is not found within our borders. In other words, there are three North American species, or two in the genus *Chelydra,* and the big fellow known as the Alligator Snapping Turtle, which is the sole representative of the genus *Macrochelys*. These animals are the largest of our chelonian species, especially the last-named, specimens of which have been taken that have weighed upwards of 140 pounds, or more. These are confined to the southern parts of the United States, in the sluggish rivers and swamps (*M. lacertina*), while our common snapping turtle, although very much smaller than the Alligator snapper, is considerably larger than any other United States chelonian; in fact, they are as pygmy and giant as compared with each other.

The present brief sketch will be devoted to our common Snapping Turtle, the scientific name for which is *Chelydra serpentina*. Captive specimens of this species have been in my possession many times, young as well as adults at various ages. Moreover, it has been studied in nature from one end of the country to the other; and

when opportunity has offered, negatives have been made by me from life. Prints from three of these have been reproduced to illustrate this account of its life and habits.

The young are generally dark brown on the upper parts, with a deep shade of ashy gray for the under parts. Older specimens are much lighter above and yellowish white beneath. There is considerable variation in these tints, however, while other characters are far more constant. For example, the under side of the tail exhibits a series of large shields, as compared with the scales of the Alligator snapper in the corresponding locality. On the back (*carapace*) of our snapper there are three longitudinal ridges—a median one, with one upon either side of it. Big snappers will come to weigh upwards of fifty pounds—rarely over forty in nature; and they have a length of shell that measures an inch or two over a foot. In some parts of the country, more particularly in New England, snappers are often kept in the "swill-barrel," where they become inordinately fat and heavy, and are then said to make fine soup.

In young snappers the tail is very long in proportion to the rest of the body. Practically, this character is manifest throughout life, while, as in all aquatic chelonians, the feet are broad and paddle-like, and evidently adapted to powerful swimming. Snappers are unable to draw into the shell either the head or the tail; much less are they able to close the shell in front or behind, as do our well known land tortoises (*Terepene*). They are pretty tough, however; not easily observed in their native element, and vicious to a fault. Personally I have never met with a mutilated snapper in nature, while box tortoises are frequently found that exhibit the result of various injuries, the majority of which have been at the hands of man. Snappers possess splendid powers of sight, notwithstanding the fact that their eyes are small, and probably their other senses are more or less well developed. In nature as well as in aquaria their backs often grow a great mass of dark green, wavy moss, which streams backwards as they swim along, and which is a source of great protection to the animal, in as much as it causes it to resemble a roundish, flat brown stone, having a covering of moss.

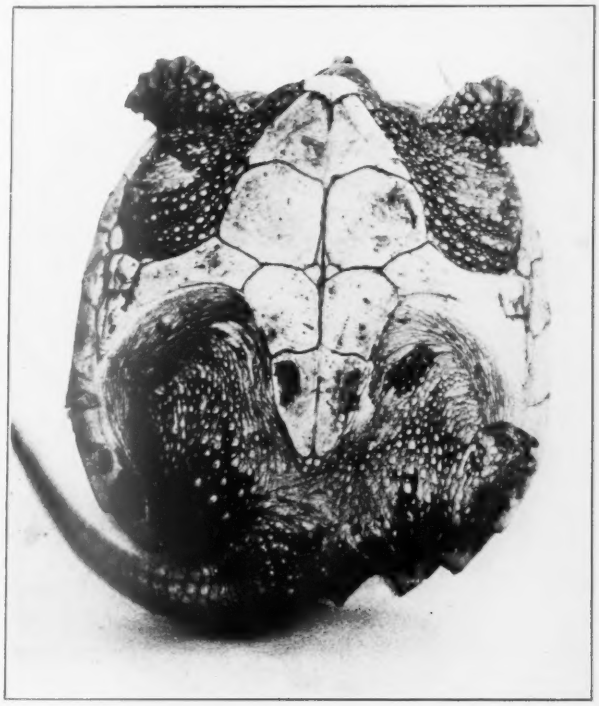


Fig. 8. HERE IS A MUCH OLDER SPECIMEN OF THE AMERICAN SNAPPING TURTLE THAN THE ONE SHOWN IN FIGURE 7. THE SCALES ON THE UNDER SIDE OF THE TAIL ARE PLAINLY SEEN, AS WELL AS ITS BIG, PADDLE-LIKE FEET

Observe the defenseless state of the body in this Snapper, and the peculiar formation of the small, elongate plastron, with its overlying plates of pale yellow.

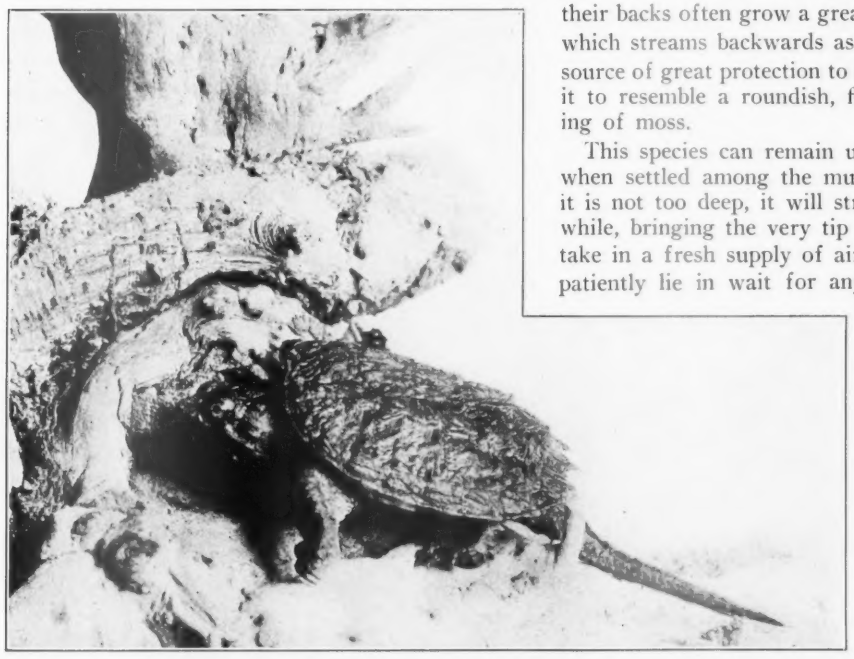


Fig. 7. THIS YOUNG SNAPPING TURTLE IS ABOUT SIX MONTHS OLD. NOTE THE GREAT LENGTH OF ITS TAIL AND ITS WONDERFULLY BRIGHT EYES

At this age the upper surface of the shell of the young *Chelydra serpentina* is dark brown, and very rough superficially.

This species can remain under water for a long time; and when settled among the mud-covered rocks, in places where it is not too deep, it will stretch its neck out once in a long while, bringing the very tip of its snout out of the water, to take in a fresh supply of air. In such situations, too, it will patiently lie in wait for any hapless fish, duckling, or frog that may swim over it; and should it come within reach—quick as a flash its long neck is protruded, its unsuspecting quarry seized, drowned or killed, and subsequently eaten by this most voracious of chelonians. The bite of a large snapping turtle may be very severe indeed, especially should it succeed in getting hold of a finger or toe; for its sharp jaws can snip such a member off as clean as though done with an ax.

Should a snapper, lying in wait for food, find that nothing is

coming his way, he will sally forth along the bottom of the muddy pond or sluggish stream in which he lives and capture such forms as he can. He has a wonderful control over the muscles of the neck and the lightning-like protrusion of the latter. Look out for your fingers and face while handling a big, healthy one; for not only can he thrust his head and neck forward in a straight line, but to either side and backwards over his shell as well. Indeed, the only safe way to pick one of these fellows up is in the same manner that we pick up a skunk—by the tail, though not, as we know, for the same reason.

There is a very great difference in the temperament of these turtles. Some of them become gentle in captivity and attached to their keepers, taking food from their hands and exhibiting other evidences of familiarity. Upon the other hand, other specimens remain as ugly and as vicious as those in nature, and will snap at anything or anybody within reach. They only feed *under water;* and many die in captivity for the reason that this imperative demand is either unknown to those who undertake to rear them, or it is otherwise ignored.

Fig. 9. THIS IS THE SAME SNAPPER WHICH IS SHOWN IN A PREVIOUS ILLUSTRATION (Fig. 8). THE SHELL IS COMPARATIVELY VERY SMOOTH AT THIS AGE, AND ITS HORNY PLATES ARE WELL DEFINED.

It is interesting to note the way in which the head sags down far below the anterior margin of the carapace, when the animal is resting in this position. The generic name of this species, *Chelydra* (Kel-i-dra) is from the Greek, it having, in ancient time, been applied to a kind of tortoise or amphibious serpent; the specific name, *serpentina*, refers to its habit of thrusting its head and neck forward like a serpent when striking.

Their breeding habits are pretty well known, for their eggs have been discovered many times. In New England, along in May, the female becomes restless and eager to deposit her clutch of round, white eggs, that have thin, tough shells; she rarely goes further than fifty feet from the stream or pond that is her home, usually much less. Having found a soft spot to her liking, she settles down in it by using her feet, trowel-fashion, upon either side of her. As she disappears by the earth closing in over her shell, she soon gets far enough out of sight to answer her purpose; and when so situated she lays her entire clutch of eggs, often to the number of a couple of dozen. Then, by a gentle, swaying movement, she works her way to the surface again, and in doing so, the loose earth falls back over the eggs, entirely covering them. In due course the eggs all hatch out, as do the eggs of other reptiles under similar conditions. When first hatched out, the young turtles are very dark colored and wonderfully cute little fellows, being frequently kept in aquaria, where they are, however, rather dangerous additions on account of their fondness for feeding on the other inhabitants. Upon hatching out, it would be interesting to know how these little chelonian tots find their way to their native element, for their size, strength, and range of vision are all apparently totally inadequate to the accomplishment of such a feat. In some situations, a heavy fall of rain would probably help them out through the flood or overflow that would naturally take place, thus widely extending the usual limitations of the pond or stream wherein reside the parents of the otherwise helpless little crew.

RAILS, GALLINULES AND COOTS

(Family Rallidae)

BY A. A. ALLEN

ASSISTANT PROFESSOR OF ORNITHOLOGY, CORNELL UNIVERSITY

"THIN as a rail" is an expression that applies as well to any of the members of this family of curious birds as it did to the parts of Abraham Lincoln's famous fence. For the rail is a marsh dweller and nature has provided it with a compressed body like that of a flea, to enable it to slip better through the dense vegetation.

There are about 180 species in the family but only fifteen are found in North America, and of these only four or five are common even in the most suitable localities. By most people they go unseen and unknown, for unless one haunts the marshes, he is apt never to see one. When a coot or a rail meets with an accident on its migration and is picked up by the corner grocer or the editor of the local newspaper, it always causes considerable excitement in the community for it is usually diagnosed as a hybrid between a duck and a chicken, or, if it is one of the smaller species, a cross between a snipe and a quail. All of the members of the family have rather long, stout legs like fowls, but their toes are always long and slender to distribute their weight when running over the soft ooze or the floating vegetation. The coot has lobes on each side of its toes to assist it in swimming, for it is much more aquatic than the other species and, like ducks, often assembles on the open water in large flocks. All species have longer necks than ordinary birds and much shorter tails, which, like domestic fowls, they hold erect. They resemble fowls also in having short, rounded wings, but their feathers are longer and softer giving their plumage a somewhat hairy appearance. The gallinules and coots, and the sora, yellow, and black rails, have short, thick, pointed bills but the Virginia, clapper, and king rails have rather long, slender, and somewhat decurved bills.

The coot and the Florida gallinule, which are perhaps the best known members of the family, are sometimes called "mud hens" or "water chickens." They are similar in general appearance, being uniformly slate color and about the size of bantams. If one cannot see the lobes on the toes of the coot, another good field mark is the ivory-white bill which in the gallinule is red and green. Both species have what is called a frontal shield, a horny prolongation of the bill on the forehead, which is not found on any of the rails. In the gallinule it is bright red and quite conspicuous but in the coot it is brownish and much smaller. When swimming both species are quite ducklike, but their heads are smaller and they are continually jerking them after the manner of pigeons. When flushed they patter along the surface for a considerable distance before they rise but when fully on the wing, they resemble small ducks. Seen on land or walking along the border of a marsh, on the other hand, they do not resemble ducks in the least but appear more like busy little hens, picking at everything as they step along, lifting their feet rather high and putting them down carefully as though they were always

DUTY CALLS

The Florida gallinule or water chicken returns to its nest in the cat-tails. Note the conspicuous frontal shield or prolongation of the bill on the forehead.

"THIN AS A RAIL"
The bodies of rails are compressed like fleas to enable them to slip better through the dense vegetation.

deeper water than the gallinule and in more open situations. Often they have to add to their nests during periods of high water to keep the eggs dry. The eggs are buff in ground color, rather evenly marked, the spots on the coot's eggs being smaller and blacker than on those of the gallinule.

The young birds are covered with black down when hatched, the coots being curiously ornamented with a fringe of orange whiskers. They are able to run and swim shortly after hatching and follow their parents about, hunting for food. It is an interesting sight to see a family of gallinules threading their way along the border of a marsh, the old ones continually calling and the young constantly peeping so that they will not get lost. As though to give the young something to follow, the old birds continually flash their white under tail coverts as they jerk along. At times the young get tired and crawl up on the back of the mother or again she calls them all to her and broods them for a while on little sneaking up on some wary insect or luckless tadpole.

They are never so cautious, however, with their voices and some of the most startling sounds that ever come from the marshes can be traced to them. Their ordinary calls are somewhat henlike: *cut-cut,* or *cak-cak,* but occasionally they give vent to a startling, *wup, pup, pup, pup, pup, pup,* or *wup-wup-wup.* Like the rails they are especially noisy early in the morning and at dusk, and occasionally they break out in the middle of the night.

Coots and gallinules build their nests of dried rushes close to the water level in the marsh vegetation, the coot usually in

FINAL INSTRUCTIONS
The two Virginia rails are about to exchange places on the eggs and Mrs. Rail is giving the last word of caution to her dutiful consort before he takes his turn.

BACK ON THE JOB
The Gallinule is incubating and has ruffled its feathers to keep cool. The nest is built up from the water with dead rushes.

platforms of rushes or temporary nests which she constructs.

In the southern states another species of gallinule is found. It is much brighter in coloration and thus gains for itself the name of purple gallinule. It is not so seclusive as the Florida gallinule and in shrubby marshes often climbs up on the bushes to bask in the sun.

Of the rails the commonest and best known is the Virginia rail, a bird about the size of a robin but of very different shape with its small head, long bill, and long legs. In general color it is dark brown, somewhat streaked on the back and redder on the breast, the flanks being barred with black and white. It is found even in small marshes, from the Atlantic to the Pacific, nesting from the Middle States to Ontario and British Columbia, and wintering from the southern part of its breeding range to Central America. It is often heard but seldom seen for it is rather difficult to flush even when one fol-

lows its notes out into the marsh. It seems to prefer to dodge through the thick vegetation like a mouse, sometimes when cornered, doubling back almost between one's feet to avoid flying.

The Virginia rail arrives from the south on its nesting grounds from the middle to the last of April when the marshes are still flooded and the new vegetation is just beginning to show green. Nevertheless one needs patience to find the birds even at this time though their notes are almost as frequent as the croaking of the frogs. The first notes heard in the spring are not very different from the spring call of the peeper but soon one hears a note that might be called its song. *Cut-a, cut-a, cut-a, cut-a,* or *racket, racket, racket, racket,* comes from a little clump of brown cat-tails, almost thin enough to see through and yet, try as one may, one cannot see the bird.

A CAPTIVE COOT

The coot is sometimes called a "mud hen." Note the white bill and the lobes on the toes.

As soon as the vegetation grows high enough to afford some protection, nesting begins and the marshes resound with their cries even during the night. A hollowed platform of rushes is built in a clump of vegetation just above the water and the tips of the flags or sedges are pulled down until a sort of a roof is formed to conceal the sitting bird from enemies passing over head. The young rails are similar to the young gallinules but of course are smaller. They are able to run about almost as soon as hatched but if danger is near and the parent birds think they are not traveling fast enough, they do not hesitate to pick them up by any convenient appendage and hasten off with them. The writer once attempted to confine a nest full of young rails by placing an enclosure about the nest, but the old birds without the slightest hesitation,

A LEAKY ROOF

But it serves to hide the Virginia rail from enemies that fly over head. The rails always pull the tips of the growing vegetation down over the nests in this way.

flew over the fence with the young ones and carried them further into the marsh.

A larger edition of the Virginia rail and much less common, except in some of the marshes of the Middle West, is the king rail. Its color pattern is almost an exact counterpart of that of the Virginia rail but it is almost twice the size. A much paler species but otherwise similar to the king rail, is the clapper rail, found only in the salt marshes. The clapper rails of the Pacific

A VIRGINIA RAIL AT HOME

Note the long, slightly decurved bill.

ON THE FENCE

This Virginia rail is about to carry its young out of the enclosure. Note the short rounded wings.

coast are somewhat browner than those of the Atlantic marshes and constitute a separate species.

The sora rail or sora is about the size of the Virginia rail but is more olive in general color with grayer underparts. Its bill is much shorter and heavier and is bright

IS THE COAST CLEAR?

A Sora rail sneaking up to its nest in the marsh grasses.

yellow in color. Indeed the bill is the most conspicuous part of the bird. Often when the sora is flushed, the bill is the best mark by which to distinguish it from the Virginia rail. In habits the two birds are very similar being equally difficult to discover and when finally flushed, both fly but a short distance with dangling legs and apparently feeble wings before dropping again into the marsh. It is practically impossible to flush either species a second time. Indeed on one occasion when the writer was tramping through a rather extensive marsh, his attention was attracted by a yellow spot close against the water. Looking more closely, he discovered a sora rail crouching low and expecting to be passed unnoticed. So completely did it rely upon its protective coloration, that it permitted itself to be touched before it attempted to escape. The eggs of the sora rail are darker in ground

CARRYING HER BABY

The Virginia rail has picked up one of its youngsters by the leg and is hastening its departure from the vicinity of the camera.

color than the Virginia's and the downy young are ornamented with a tuft of orange whiskers on the chin and a brilliant red cere like a ball of red sealing wax above the bill.

There are two other rails found in the United States and Canada but both are rare. The yellow rail is some-

"WHOSE BLACK BABY ARE YOU?"

A young Florida gallinule only a few hours old.

A HOME IN THE MARSHES

This nest of a Sora rail is in a large plant of the Arrow arum.

what similar to an immature sora but is considerably smaller and can be distinguished by a white patch in the wing. The black rail is the smallest and least known of them all, being but little larger than a wren. Since it darts around like a mouse through the grassy marshes and is seldom flushed, it is scarcely ever seen even where it is nesting.

Rails on the whole are not very intelligent birds and because of their life in the dense vegetation have apparently become very short sighted. They are quick to detect motion but if one remains perfectly still, they will sometimes approach and even run over one's feet. With their short rounded wings and soft plumage, it is not to be wondered at that they prefer to run rather than to fly, but it is surprising to discover what long distances some of them traverse on the migration. Sora rails, for example, regularly migrate to South America and on one occasion, at least, a sora has flown across the Atlantic to Great Britain.

Rails, gallinules and coots are all considered game birds and are shot in considerable numbers, especially in the South. The rails are very small, however, their flesh is of inferior quality, and they are such weak flyers that they furnish a very low grade of sport for hunters other than boys.

Photograph by H. L. Sharp

A SORA'S PROSPECTS

Three of the eggs have hatched into little black powder puffs that are curiously ornamented with tufts of orange whiskers beneath the bill and drops of red sealing wax above.

SOUTHWESTERN FOREST SUPERVISORS HOLD IMPORTANT CONFERENCE

HOW to obtain an accurate inventory of the timber of the Southwestern National Forests, to determine the extent of past cuttings, to secure growth and yield figures, in short to lay a better foundation for scientific management of the Forests, was one of the chief topics of discussion at the meeting of the fifteen supervisors and the district officers of the Arizona and New Mexico Forests, who met in Albuquerque, New Mexico, during the week beginning February 10th. A workable scheme for an extensive program of silvicultural management was presented and approved.

Many other problems of Forest administration, particularly those dealing with publicity, land classification, education, game, fire protection and grazing were debated.

The timber sale business in the Southwestern district is large. In the fiscal year 1918, 121 million feet were cut under sale contracts, having a value of $273,500.00.

At this meeting was displayed a device for more accurately determining the location of forest fires, invented by W. H. Gill of the Albuquerque office of the Forest Service. The device, called a cameragraph, is a proposed substitute for panoramic maps, which have been extensively used in both eastern and western Forests, especially in connection with the Osborne "fire-finder" in the northwestern Forests.

Forestry for Boys and Girls

by E C Cheyney

THE PINE WOODS FOLK

SQUEAKY CHIPMUNK MAKES A DISCOVERY

By E. G. CHAYNEY

SQUEAKY CHIPMUNK woke up with a very distinct feeling of chill and decided that someone must have left the front door open. He did not tear up to the door excitedly to see what had happened as he ordinarily would have done—for the truth was that he was only about half awake. In fact he had been only half awake for several weeks. Ever since the snow had closed over the entrance to his house he had been sleeping most of the time when he was not eating. He had had some awful dreams of the food supply giving out before the snow melted.

"That's what it is," said Squeaky, suddenly wide awake at last, "the snow must have melted."

He gave one sharp squeak to his sleepy little wife and rushed up the narrow passage to the doorway. Sure enough, the snow was gone and the sun shone full in his face. The sun blinded him at first after the long weeks he had spent in the dark and he blinked contentedly in the warm sunshine without seeing much.

Slowly it dawned on Squeaky that he could hear a strange, rasping sound not so very far away. His curiosity was almost eating him up and he strained his eyes to look through that dazzling sunlight. Gradually things began to take definite form. At last he could see. Sure enough there was that old prickly porcupine eating all the bark off of one of those very Norway pine trees which Chatter Box's grandfather had planted. Squeaky was terribly excited.

"Hey, you old quill pig," he screamed, "Stop that right away!"

Porky stopped eating and listened a minute. He did not hear anything more and started to eat again.

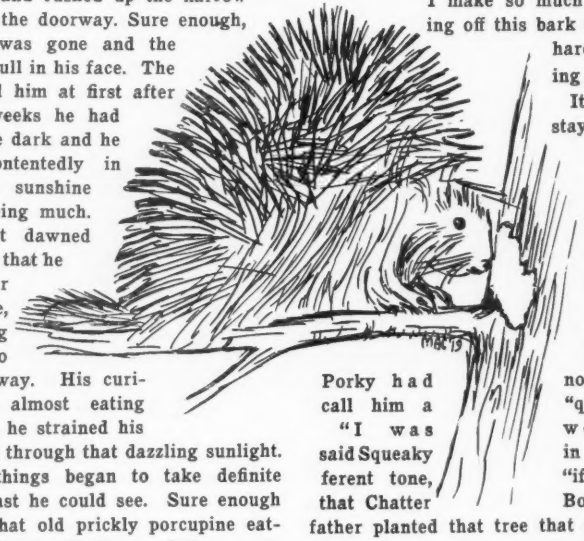
"Did you hear what I said?" Squeaky screamed again as he hopped excitedly to a stub on the top of the old dead log.

Porky paused again and looked curiously around to see where the sound came from. He saw Squeaky and settled comfortably down onto a tiny little limb which did not seem nearly large enough to hold him and prepared to talk. He had not seen any of his friends for some time and he was quite ready for a friendly chat.

"Hello, Squeaky," he called down cheerfully, "did you speak to me?"

"Did I speak to you?" Squeaky shouted, tweeking his little tail angrily, "I screamed at you as loud as I could."

"Well," Porky said pleasantly, "you see I make so much noise knawing off this bark that I have a hard time hearing anyone else."



It was hard to stay angry with anyone who spoke so pleasantly and Squeaky began to feel a little bit ashamed of himself. He hoped that Porky had not heard him call him a "quill pig."

"I was wondering," said Squeaky in a very different tone, "if you knew that Chatter Box's grandfather planted that tree that you are eating up?"

"Is that so?" said Porky looking at the tree with a new interest.

"Yes," said Squeaky, feeling quite important, "he buried a cone there and those three trees grew from it."

"Well, well, well," said Porky, " I guess it's the only good thing that he ever did."

Squeaky felt a little taken back. "But you will kill it that way," he remonstrated.

Porky looked thoughtfully at the four feet of trunk that he had skinned. "I expect it will," he said indifferently, but I have to eat something."

"Why don't you eat some of those little popples?" Squeaky suggested. "They grow faster and no one would miss them. That tree there has been forty years growing up and you will kill it in three or four meals."

"That's a fact," said Porky, "I never thought of it in that way. I usually do eat those small popples, but I saw old Longfang, the wolf, yesterday and he looked so hungry I climbed this big tree to sleep."

"Look out!" Porky shouted suddenly.

There was a rush and a vicious snap as Longfang's cruel teeth closed on the place where Squeaky had been. It was a narrow escape and Squeaky was huddled close up in the end of the long passage with his heart pounding against his ribs. "After all, "he thought, "there are some people worse than old Porky, even if they do not eat trees."

THE PUSSY WILLOW

Said the fuzzy pussy willow,
As he ruffled in the breeze,
"I surely am the handsomest
Of ornamental trees.

"When the snow is mostly melted
And the flood is on the flats,
My kitten willow budlets
Turn to pussy willow cats."

SWAMP TREES

(Answer to Boy Scout Question No. 1 in January)

Our swamp trees do not as a rule grow in the stagnant swamps because they like it. They are there because they have the ability to exist under those unfavorable conditions where very few of the other trees could grow at all. That is, they have gone in there to escape competition.

The tamarack, the cypress, the black spruce and the white cedar are all considered typical swamp trees. But take those same trees out of the swamp and put them in rich well-drained soil where they will be protected from the competition of their stronger enemies and what happens?

They grow about twice as fast as they did in the swamp because the roots get plenty of fresh air. The swamp is an unfavorable location and no tree will do its best there.

THE EFFECT OF SHADE

(Answer to Boy Scout Question No. 2)

You have probably noticed that when two trees are growing close together most of the limbs are on the outside and the trunks of the trees will be practically free from limbs on the sides next to each other. This is because the limbs are unable to grow in the shade. It is the same cause that cleans the limbs from the trees in dense forests and makes them grow with tall clean boles, when those same trees if grown in the open and singly would probably have many limbs coming almost down to the ground.

This is true to a certain extent of all

(*Continued on Page* 1016)

DIGEST OF OPINIONS ON FORESTRY

WILL YOU NOT CO-OPERATE WITH US BY IMPRESSING UPON THE EDITOR OF YOUR NEWSPAPER THE IMPORTANCE OF FORESTRY? WRITE TO YOUR NEWSPAPER

BOSTON HERALD.—The presence in Boston of the New England Forestry Congress reminds us of certain facts whose bearing upon the industries and prosperity of the land our people are only beginning to realize. The relation of forests to rainfall is a recent concept in physical geography. The older text-books contain but slight reference to the subject. Within the last quarter of a century science has reached the conclusion that the conservation of forests near the headwaters of great rivers is essential to preserve the fertility of the agricultural lands in the watersheds, to maintain the navigability of the rivers and prevent destructive freshets and to supply the waterpowers of which Mr. Harriman spoke in his address before the Congress.

Chicago Daily Tribune.—It is doubtful if there is in the whole Middle West a district that lends itself more readily to the purposes of a national park reserve than the dunes at the south shore of Lake Michigan. Why not the Roosevelt National Park in the dunes of Northern Indiana?

Chicago American.—If the Roosevelt memorial is to be in the forest preserve, why not have a forest for a memorial? Let the Park Commissioners set aside 500 or 1000 acres out of the 13,000 of the preserve and plant a great forest as a Roosevelt memorial.

Dayton News.—The Kiwanis Club, of Washington, has sent to every other Kiwanis Club in America a request to join in the planting of memorial trees for soldiers and sailors who lost their lives in the great war. Each Kiwanis in the United States is urged to see to it that a memorial tree is planted for every one of its members who died or was killed while serving in the Army or Navy, and it is understood that the recommendation has been received with general approval.

Grand Rapids Press.—"If the State of Michigan would simply enforce the law requiring railroads to keep spark arresters upon the smokestacks of their locomotives the northern counties would become reforested within 25 years," said a Kent circuit judge Tuesday. "'The law is plain, and I have called the attention of certain State officials to it several times, but no action has been taken."

Jacksonville Times-Union.—In this State the law forbids the setting of fires, for any purpose, except between the first of February and the last of March, and all good citizens should try to have the law enforced. The fires allowed are only to be started after due notice to people living within two miles of the lands being cleared or pasture lands, and public sentiment is turning against any fires in the grazing lands.

Springfield (Ohio) Sun.—The idea of planting a tree for every soldier who died for his country, making an avenue of noble, living things, which shade the wayfarer for all time to come, is peculiarly fitting, and Springfield seems about ready to adopt this plan of commemorating the heroic sacrifice of her four-score and ten sons in the war with Germany. The idea of memorial trees would seem to make visible that glorious immortality for which every soldier laid down his mortal body.

Dallas (Texas) Journal.—The American Forestry Association has suggested that every community in the United States shall take steps to make its community Christmas tree permanent; that it shall use a living, growing tree for Christmas purposes; that trees for this purpose shall be planted and cared for. Millions of trees are ruthlessly destroyed at every Christmas season to serve unnecessarily a temporary purpose.

Huntington (Ind.) Herald.—Our American boys ought to be remembered with American trees—elms, maples, poplars, gums, sycamores, hickories, walnuts, pines, cedars, birches or one of the many others that will be both ornamental and useful.

Hillsboro (Ind.) Times.—Thousands of city streets and country roads can be made attractive at comparatively small expense for trees and the labor of planting, and the programs of the dedication can easily be made as impressive as those of Decoration Day. The plan also has merit in its possibilities of indefinite continuance.

Moline Dispatch.—Women of Moline, and some of the men, are becoming increasingly incensed at the cutting down of many of the city's beautiful trees—trees which it takes two human lifetimes to grow, and which are often of more benefit to mankind than are some men and women. It is averred by those most interested in the beauty of the city that they are being cut down without legitimate reason or excuse. No one should be allowed even to trim a tree who does not know the business.

New Rochelle (N. Y.) Daily Star.—Senator Walter A. Law, Jr., has introduced a bill at Albany that will meet with the commendation of every lover of nature in the State. It amends the village law in relation to the planting, care and preservation of shade trees.

Christian Endeavor World.—Memorials to those that have fallen are a natural sequel of war. The question is becoming a frequent one whether stone and bronze furnish the most fitting monuments. There is a growing feeling that men ready to give their lives for their country would be most honored by being associated with something that is itself of service to their fellow-men. It is finding expression in memorial highways and bridges and parks. One of the recent suggestions is that the best reminder of a noble life should itself have life. The American Forestry Association has proposed that the heroism of our soldiers be commemorated by setting out trees. The reckless waste of our forests has awakened the nation to the need of systematic measures for replacing them. The value, as well as the beauty, of trees is becoming more appreciated. The observance of Arbor Day will doubtless be more general this year than ever before, and in many places it will be closely linked in thought with Memorial Day.

Boise News.—There is a good deal of discussion current about the type of monument to be built to commemorate the men who died for their country. The idea of planting a tree for every soldier who died for his country, making an avenue of noble, living things, which shade the wayfarer for all time to come, is peculiarly fitting. It seems to make visible that glorious immortality for which the soldier laid down the mortal body.

Ironton (Ohio) Register.—If the people of this country do not at once begin planting black walnut timber they will make the mistake of their lives. Now that the war has developed the respective values of foodstuffs, we are coming to understand what we have annually wasted in the walnut crop.

WALKS IN THE WOODS

(II) "AROUND ROBIN HOOD'S BARN" TO THE GRASSY SPRAIN WOOD

BY J. OTIS SWIFT, AUTHOR OF "WOODLAND MAGIC"

(PHOTOGRAPHS BY THE AUTHOR)

A GLINT of gold in the winter sunshine; filmy blue the mountains on the western horizon; a soft haze veiling the Hudson below us, and lazy fish-hawks circling in the ether above the Tappan Zee! The cobwebs of a week's work indoors tangle up our thoughts as we gaze out of the window here in the Manor at Hastings-on-Hudson. Let's get out in the woods and see if we can, perchance, snare the old enchantment once again. You'll come along, just to keep me company, and, too there's a world of interesting things to see over in the Grassy Sprain forest. The old Dutch settlers around Hastings stamped their hallmarks on many things. One was the little Grassy Sprain brook that runs down through Westchester County from up near Pocantico Hills, the home of Mr. Rockefeller, to the Yonkers reservoir.

As we go down an old colonial wood road to the Nepperhan Valley, starlings whistle sharply in the tall tulips and white oaks by Robin Hood's Barn. Robin Hood's Barn, you know, was the wild wood. The way to the silence and restfulness of Nature's laboratories is always "around by Robin Hood's Barn." When our modern philosophers talk of going into The Silence as something new, I recall the old monks and anchorites who used to seek out the woodland caves and rock cells in the fastnesses to commune with their Maker. The silence of the wood, as we go down this path, is so great one may almost hear the rythmic beating of the big heart of Nature, to say nothing of the soft whispering gossip of black birch and hemlock rehearsing all the scandals of the jungle.

AN OLD COLONIAL WOOD ROAD BY ROBIN HOOD'S BARN

Downy woodpeckers and blackcap chickadees are busy over the grubs in the bark of the dead chestnuts. Neat, lady-like, gray-robed juncos flirt their two white tail-feathers like momentary glimpses of ruffled lingerie peeping beneath skirt bottoms in country dances, as we turn again into the woods off Jackson Avenue beyond Mt. Hope and come suddenly upon a wayside spring under the roots of a gnarled old beech. Revolutionary troops passing between White Plains and Dobbs Ferry used to eat their noon-day lunch beside this spring. Over these picturesque hills were camped the French army under Count de Rochambeau in 1781 while he and Washington planned the Southern campaign. Some of the most celebrated soldiers of Europe may have stood on the greensward here. Harvey Birch, the American spy, often drank from this pool, and no doubt Washington Irving, who knew every bit of the countryside hereabouts, drew mystic fancies from the shadowy depths where the water sank away under the mossy bank and crawling beech roots. The beech is covered with deep-cut initials, and some thoughtful soul has carved, right over the drinking place, *Pro Bono Publico*—for the good of the people.

As we sink our lips in the cold water a speckled trout darts out from a recess under the bank, flashing his red-gold spots for a moment in the shaft of sunlight, and is gone. He has been a willing prisoner since the high water last Spring. Pincushion, lichen, and fairy-cup moss is pleated over stone and wet earth. There are deep fern-festooned crevices where it is not hard to imagine that on moonlit nights little old men—gnomes and brownies with frogskin breeches and milkweed-silk doublets, come out to dance with the laughing, frolicking, thistle-down clad naiads and fays from the bullrush fens near the brook below.

You should come along this brookside path from the spring—worn by who knows what lagging feet of hoboes, Ishmaelites and lovers—on a moonlit summer's night when the underbrush is aglimmer with the mysteries of glow worms, lightning bugs or phosphorescent wood, and a-whisper with the love-songs of crickets, locusts, cicadas and katydids. Above are the great cathedral arches made by reaching arms of elm, yellow poplar, oilnut and red oak that fill the imagination with strange, incomprehensible throbs of emotion originating in the primordial days when you and I—who knows—instead of

plodding through brake and pink azalea by the brookside, would have been up there sweeping gracefully over yawning, moonlit depths from limb to bending limb and throwing down nuts and sticks to tease the sabor-toothed tiger and cave bear lurking in the shadows.

There is no snow on the ground just now, and we are struck with the beautiful precision with which each sharp awl-like skunk cabbage, green or purple, sticks up through the frosty mud by the brook. This skunk cab-

A PICTURESQUE AND INVITING WOOD PATH IN LATE WINTER

bage, blossoming among the snowbanks and mud-flats in January, is the first flower of Spring, undoubtedly.

What a jungle there is here in the bottom land of black mucky loam! Christmas ferns, Maidenhair ferns, rock ferns, brakes, sarsaparilla, jack-in-the-pulpit, moonwort, snakeroot, pinkster, feverbush, sassafras, and dogwood, all growing year after year, dropping withered leaf and sere stalk back into the mixing bowl to rot and form that wonderful black surface soil that is the fertilizer of the great old forest trees towering above. This is Nature's kitchen where she kneads over and over the earth-stuff for reincarnating her little plant and mighty tree folk. It is her laboratory, workshop, her hospital where she performs miracles of surgery and resuscitation. We reach down among the decayed, lichen-covered roots of an ancient hemlock stump and take up a handful of this wonder-working black loam and ponder over it. It is so clean we would not hesitate to taste it—and yet it is the decay of centuries here in the forest, centuries of bird, animal, insect, plant and fungus life. It is the stuff that once may have been the bloom on the cheek of an Algonquin maid, or the delicate veining in the lip of the white violet, the tough heart of many an oak or chestnut, or the taloons of eagle or fishhawk. It's the dough from which all this loveliness about us was fabricated, and, after a fashion, from which we, ourselves, came. It comes the nearest to being the mysterious Philosophers' Stone of the Magi, for it is one thing that, with careful conservation and manipulation, turns everything to gold. It is the foundation of the forests which are the foundation of the wealth of the peoples.

Note for a moment the fallen timber in this little patch of wood. There are similar patches all over America. When I visited John Burroughs on his eighty-first birthday the country was anxious about the fuel supply, to get it through the season of 1917-18, and Burroughs agreed with me that if the fallen wood in the forests of

UP AMONG THE GREAT LEDGES THE FERNS ARE STILL GREEN

the eastern states had been gathered it would have gone far toward keeping the Storm King out of the sitting rooms of America that winter. Of course there is the labor problem—but take an old hay rack and a dozen children down any picturesque wood path in Autumn and see how quickly it can be filled with wood-knots and bone-dry limbs that crumble naturally into castles of coals in the open fireplace, and bake apples such a candied brown on the hearth in front. Clearing up the under-

brush gives young trees a chance, avoids forest fires, and obviates the necessity of cutting down many live trees for firewood.

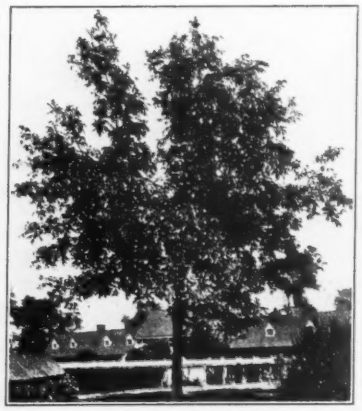
A tree has such a personality, a possibility for vast good to the race to be considered, that no one should cut it down without due thought and care. When we have learned to respect our forests as we do our live-stock, America will have laid the foundations for solving many a tragic economic problem looming so darkly now. Mankind in his primitive days lived in the forests. He fled there for protection as to a mother in his infant centuries. Robin Hood sought sanctuary there. The hunted outlaw flees him to the greenwood tree. You and I are out here today for rest and comfort in the strength of the forests. When we in America have spent our rich inheritance in thoughtless living, our streams are drying up, and the desert stretches across the continent without the voice of bird or animal, and our fields are running out—we'll return to the protection of the forests as once they protected and cared for us, or we'll go the way of Tyre, Sidon, and the dodo. Not only must we protect the Adirondack forest, the great national parks, the White Mountains, but also every little woodlot all across the country like this at the Grassy Sprain.

LOTS OF FALLEN TIMBER IN THIS LITTLE PATCH OF WOOD

Right here on the edge of the bog, among the grass-roots, ox-eyed daisies and buttercups, last Spring, I found the round leaved orchis, though it does not grow commonly back in the bog where the marsh marigold, the cowslip, grows. I took it home for my wild garden and expect great things of it next Spring. Incidentally it is interesting that so many beautiful denizens of the wild wood grow in one locality and do not appear in some other close by. The wake-robin grows everywhere along the Palisades on the west side of the Hudson, for instance, but I have never found it in Hastings on the east side of the river.

While I am taking you along the State road to show you where the watercress grows under a bridge in the Sprain brook, and where the closed gentians are the color of the bluebird's back in Autumn, where in the deep woods the box turtles lie luxuriating in the cool edges of the swamp on hot summer days, I want to tell you what I heard of the conversion of a very dyspeptic, cross, material-minded man whose boast it was that there was nothing in the world that couldn't be understood by his common sense, and that he was from Missouri, anyway. He was told by his physician that if he didn't get out into the woods for a summer, he would die. He didn't want to die, somehow, and so he came out here into the Grassy Sprain forest, grumblingly and complainingly, as a man going to his grave or a prison. In a juniper grove where the gray squirrels woke him every morning with their peculiar scolding, he lived all summer in a tent with only the great shagbark hickories, white oaks, hemlocks and junipers for companions. He went almost naked in sunshine and rain, cooking his own food like a hunter, and when he went back in the Fall, the color of a brown nut and with added chest expansion, he had not only regained his bodily health, but his boyish heart and a close knowledge of the habits of all the birds, animals and trees. What seemed to me more important, though, was that through the long evenings sitting in his hammock by the campfire and listening to the music of whip-poor-will and veery, he had gained a suspicion that there were, perhaps, in the mystic pathways where rabbits flitted silently; in the caves under mossy stumps, and in the moonlit spaces along the brookside, tribes of eerie Little People who spent their days painting the delicate tints into the jewelweeds and dogtooth violets, and coloring the pink mushrooms and fungi, and their evenings dancing, probably, on mossy stones up among the great ledges where, as we pass, we find the Christmas fern still green this winter day. I don't say he believed these things, mind you, for who really knows? But when he went back to the town in the Autumn he was no longer sure there were not things in the world that he had never seen with his two cold, disbelieving eyes. That very suspicion, that there might be things he didn't know about, filled his mind with a new and delicious delight, a sense of baffling mystery, and started it growing again. He had found a new interest in living, and, more important, in dreaming, and he was no longer a cynic.

THE first school of practical forestry in Scotland was recently opened at Birnam, in Perthshire. The school building that has been erected at Birnam is itself an example of what can be done in forestry, being entirely built of home-grown wood. At present the school has twelve students. The course will cover two years and will consist of both practical work and lectures. The Duke of Athol has placed his woodlands at the board's disposal for practical instruction and the aim of the school is both provision of technical instruction and the furnishing of openings for discharged service men.



A Beautiful English Walnut Tree in Washington's Garden, Mt. Vernon.

The Great Washington

probably did not know that an acre (50 trees) of

English Walnut Trees

will produce in a single year food equal to 60,000 eggs (as asserted by Dr. J. H. Kellog), but he did know the great value of nut trees and planted them around his home at Mt. Vernon. *You* may not know that at Rochester we have highly developed the

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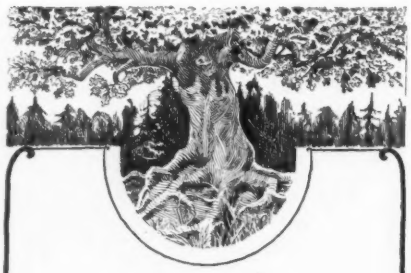

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SELL FUEL WOOD BY WEIGHT

WOOD for fuel should be sold by weight instead of by cord measure, for the heating value depends not upon the bulk of the wood but upon its weight, say foresters of the United States Department of Agriculture in Bulletin 753, recently published. A pound of dry wood of one species has about as much heating value as a pound of any other species, but two cords may vary 100 per cent in their value for heating.

It is the custom to sell hardwoods and softwoods at slightly different prices because of differences in heating values. This is only a superficial classification, however, as two species of hardwood may have heating values widely different. Where hardwoods and softwoods are mixed together wthout regard to the proportion of each, the values may be so different that one man may, for the same money, buy twice as much heating value as another. The shape and size of the sticks may also cause great variation in the actual amount of wood substance, and therefore of fuel. If weight were the measure, the species, shape, and size of sticks would make little difference, provided the wood were thoroughly seasoned. It would be necessary, however, to fix certain standards as to time of seasoning of wood, the specialists say.

The bulletin points out that there is special opportunity for greater use of wood for fuel in New England, New York, New Jersey, Pennsylvania, Ohio, Indiana, Illinois, Iowa, Missouri, and the Lake States, where there is a rural population of about 20,000,000, which is estimated to use annually 18,000,000 tons of coal. A considerable proportion of these fuel users will find wood available close enough to their own neighborhood to make long freight hauls unnecessary. By turning to wood they will not only conserve the fuel supply and relieve transportation, but are likely to contribute to the prosperity of their own community. For one thing the opportunity to sell wood fuel would tend to encourage the improvement of farm woodlands by proper thinnings.

An increased market for wood fuel should open up good opportunities for operators of thrasher and silo-cutting outfits or others who have gasoline or kerosene engines to do custom sawing during the winter, according to the bulletin.

The bulletin contains many suggestions as to how to develop and handle the woodlot to the best advantage. How to produce wood, how to sell it, and how to use it are all covered in a practical way.

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TREATING WOOD

"LONG Life for Wood at Low Cost" is the name of a valuable booklet which has just been published by the Barrett Company. It treats in a very practical and thorough way of the protection of wood from destruction by decay and insect attack through the application of creosote oil and it tells of the simplicity and ease with which this preservative may now be used.

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Some Government War Secrets

—and the reason for the Victory Liberty Loan

"WE HAD promised the Allied war-chiefs that we would have in France by July of last year, 600,000 men. On that date we had a little over 1,900,000. We had behind them nearly 2,000,000 in this country under training who would have been on the front before July, 1919, and we had behind those 4,000,000 men as many more men as were necessary to do the job.

"Four million men in France meant at least 20,000,000 tons dead weight of shipping to take care of them, and we had that program under way and were making our maximum output just about the time the armistice was signed. Twenty million tons of shipping at present cost means just about $4,000,000,000 or a little over.

"Did you know that those 2,000,000 men in France, who did so much to bring the war to an end, had only one small battery of American-made artillery behind them; just one battery of 4.7 and a few big naval rifles! The rest of the artillery used by the American soldiers was made by Frenchmen in France. But, on the way was a great stream of guns and shells that would have blown the German army off the earth. But that stuff had just come into large production in November, 1918. And it is for the deliveries on that big peak production that we have to pay in December and January and will have to continue to pay for in February."

* * *

"Our program for tanks, of which few got into action, was, I have been told, to provide for a tank in 1919 for every 75 feet of the front."

* * *

"Those are some of the things that cost money, and practically none of those great supplies of artillery, of shells or tanks, even of ships, practically none of that stuff was ever used. What an awful waste! We are asked to pay for a dead horse that never drew a load! It is discouraging, paying for something that is no good!

"Well, let's see if it's any good. Do you realize that the German army was never really routed; that except for a little bit of a stretch down in Alsace-Lorraine it was never fighting on German soil? They were brave soldiers, the German soldiers. They still had millions of them on the Western front. And yet they surrendered while they were on foreign soil. They had a fleet which had required years and years and years to build and it flew the white flag without firing a shot."

* * *

"I cannot believe that these great stores of munitions were wasted. In addition to the bravery of the American doughboy that arrived in France and got into action in numbers about the 15th of July and turned the tide and drove the Germans back, in addition to his bravery and his almost reckless spirit of determination, for which the praise cannot be too high, I say in addition to that, I believe there was one other factor that brought this war to an end at least one year before the most optimistic of us had dared to hope for. One other factor, and that was that Germany, her general staff, knew that back of the few hundred thousand Americans that really got into big action, and back of the 2,000,000 in France, was another 2,000,000 ready; and despite the fact that we had practically no artillery of American make on the Western front, that there was a great stream of American-made artillery on the way. And it is my conviction that the German staff knew that if they prolonged the war into 1919, they were inviting, not certain defeat, but certain annihilation."

* * *

"We are asked to pay for things that were never used; we are asked to pay for shells that never were fired; for cannon that never reached the battlefront, but we are asked to pay for those things that helped in a major way to bring this war to an end in 1918 instead of 1919. And the bringing of this war to an end twelve months before we could logically look for it means that *we are asked to pay for saving the lives of 100,000 or 200,000 American boys who would have died on foreign soil had the war continued another year."*

—Extracts from a speech by Hon. Lewis B. Franklin, Director War Loan Organization, U. S. Treasury Department.

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CANADIAN DEPARTMENT

BY ELLWOOD WILSON

PRESIDENT, CANADIAN SOCIETY OF FOREST ENGINEERS

THE most important event from a forestry standpoint of the past month was the meeting between a committee of the Quebec Limit Holders' Association, some members of the Woodlands Section of the Canadian Pulp and Paper Association and the Hon. Jules Allard, Minister of Lands and Forests. This meeting discussed with the Minister the advisability of planting on government lands held under lease and ways and means of accomplishing reforestation. The concensus of opinion was that reforestation was a pressing necessity and that the government should bear some of the financial burden of such work. The Minister said that he was quite willing to consider any plan which the Committee would bring forward and would, when such scheme had been approved by the Committee and himself, bring down the necessary legislation. Ways and means are now being considered and the Committee will shortly meet to discuss the subject in all its different aspects and decide on what shall be presented to the government. The ravages made by a fungus disease on the balsam are becoming so serious that in a short time the present stand of this species will all be affected and it will not be possible to cut it. As it forms about 60 per cent of our total soft wood stand this will cut the length of time for which we have sufficient wood in two. The only means for combating this disease that seems to be known is to burn the debris from logging and gradually try to clean up the woods. This would have the added advantage of reducing the danger from forest fires and also the cost of fighting them but would increase the cost of the wood.

An active interest in reforestation is being taken by the larger and more progressive paper companies. The Laurentide and Riordon Companies have been planting for some years and this year the Price Brothers Company, The Abittibi Company and the Belgo-Canadian Company are making plans to commence. Such progress is indeed noteworthy and speaks well for the future of our timber supply.

A standardization committee, consisting of the Managers of the co-operative fire protective associations, the Manager of Dominion Parks, a member of the Forester's staff of the Railway Commission and a member of the Dominion Forestry Branch, together with the Foresters of Ontario and New Brunswick, has been formed which will try to correlate and standardize fire protection methods and to develop new and improved means for fighting fires. This is a long step in advance and will certainly bring good results and increased efficiency.

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MASSILLON Dept. F OHIO

The Annual Meeting of the Dominion Conservation Commission was held in Ottawa in February and reported progress along forestry lines in all parts of the Dominion. Especially encouraging was the report on the research work completed during the past season and the large program for the coming summer. The Provincial Governments and private firms are co-operating both with financial help and through their forestry personnel. The information being obtained is absolutely basic and is necessary before we can make any intelligent plans for handling our woodlands in the future. Permanent sample plots have been laid out where questions of growth, future yields, insect and fungus injuries, effect of slash disposal methods, reproduction on old burns, and the effect of different methods of cutting are being carefully studied. Plots have also been established for the study of planting under different conditions of soil, number of trees, various associations of species and other important questions. The effect of the drainage of swamp areas on tree growth is also being studied. In one section a permanent camp for the housing of personnel and equipment has been constructed.

Messrs. Robson Black and Ellwood Wilson spoke at the Forestry Conference held in Boston, under the auspices of the Boston Chamber of Commerce, February 24 and 25.

A. C. Volkmar, who has been for some years the Forester of the Riordon Paper Company and has put their forestry department on a splendid basis, has taken a position with the Canada Paper Company. He will have charge of the mapping and estimating of their new limits and will prepare a working plan for their exploitation.

Lieut H. G. Schanche, who left the Laurentide Company to enlist in the aviation section of the U. S. Signal Corps, has been discharged and has again taken up his duties with the Laurentide Company.

Sergeant Arnold Hanssen, of the Canadian Society of Forest Engineers, had a very narrow escape just before the signing of the armistice when a shell splinter or machine gun bullet went through his steel helmet. He has been taking a trip through southern France and Italy and expects to visit his people in Norway before returning to Canada.

There has been a great shortage of timber in South Africa during the war and but for the foresight of the early settlers the situation would have been very serious. It is felt that a vigorous tree planting campaign should be undertaken. The railways have already done some work along this line. They now have 55,504 acres under management, of which 23,532 acres have been planted. The oldest are sixteen years of age and are already yielding marketable timber from which a considerable revenue is obtained.

The Canadian Forestry Association is entering a new year of usefulness with 8,000 members.

A new company, the "Norske Kemikalier" with a capital of half a million dollars, has been formed to produce medicinal and chemical compounds from the destructive distillation of wood. The principal material is fir tree roots.

There is at present some inquiry for Canadian timber lands from England and Norway and some sales have been made.

The International Paper Company which owns some two thousand square miles of timber limits in the St. Maurice Valley, are

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about to commence the erection of a large paper mill at Three Rivers, Quebec. It is said that they will spend about six million dollars. This addition to the mills in this valley will make it one of the most important paper producing sections in the country, and will be a great addition to the industries already operating in Three Rivers.

A delegation consisting of Sir William Price, Brig.-Gen. J. B. White, D. S. O., and Ellwood Wilson, with other members still to be announced, went to Ottawa on March 18 to impress upon the government the necessity of using returned soldiers for reforestation work. In the opinion of General White, there is no other work so well suited to those men who have been gassed or shell shocked. He estimates that there are about fifteen hundred such men to be cared for. The Dominion and Provincial Governments have large areas of lands which could be planted and also nurseries from which stock could be supplied.

The general opinion of all those who have observed its results, is that in the forests of eastern Canada, the diameter limit has been worse than a failure. Its effect has been to take out the best trees and leave all the poor ones. It was always supposed that the smaller trees left would grow and produce a second crop but it has been definitely proved that most of these are suppressed trees which rarely take on any new growth after the removal of the larger ones and then only after some time. If the stand is opened up appreciably almost all of them blow down. The removal of the spruce has encouraged the reproduction of balsam and now that the balsam is being heavily cut the forests are rapidly becoming almost pure hardwood stands. It is hoped that some other method of regulating cutting in our forests will be developed. The Quebec Government already has made arrangements by which a license holder can ask to have a forester examine the land he wishes to cut, and if in the forester's opinion, some other method of cutting than that laid down in the regulations would be better, he may give permission. This is certainly a step in the right direction.

FORESTRY FOR BOYS AND GIRLS

(*Continued from Page* 1007)

trees, but some species are able to stand much more shade than others. Those with a dense, heavy foliage—that is those that make good shade trees—can stand more shade than those with less dense foliage. The sugar maple is a very good example of the former and the ash of the latter.

Consequently, when these two species, the sugar maple and the ash, happen to grow side by side, the light shade of the ash has very little effect on the growth of the sugar maple, while the dense foliage of the sugar maple is almost sure to clean all the limbs off of the near side of the sensitive ash.

QUESTIONS FOR NEXT MONTH

(1) In a dense stand of basswood, maple and hickory, what species of young growth do you find?

(2) What hardwood tree has a bud with a decided hump on the side of it?

WHAT THEY SAY

"I have read with great satisfaction the article by Dr. Shufeldt in AMERICAN FORESTRY on budding leaves. The fringe tree especially interested me. Thank you for giving me so much pleasure in these cruel days."—*Dan F. Bradley.*

"We are now furnishing your magazine to one of our Log Camps, and two of the individuals of our company are also subscribers. This is a good magazine and we get a good deal of pleasure from reading it.—*P. R. Caray, Vice-President Camp Manufacturing Company.*

"I have been greatly attracted by your series of articles and the excellent photographic illustrations in AMERICAN FORESTRY."—*Homer D. House,* August 15, 1918.

"Let me thank you for having sent to me the copy of AMERICAN FORESTRY containing Dr. Shufeldt's charming article on pictures and plants for Christmas. It always does me good to read things like this."—*Waldemar Kaempffert.*

TRAINING COURSES IN WOOD INSPECTION

THE inspection of wood has played a greater part in the manufacture of aircraft than in any other important industry and at the beginning of the war the number of men qualified for this work was very limited. The Forest Products Laboratory at Madison, Wisconsin, prepared a handbook for inspectors and conducted short training courses in wood inspection.

There is a very definite possibility that with the coming of peace similar courses of instruction for representatives of manufacturing plants in the wood using industry will be instituted. A number of manufacturers have expressed a desire to send men to the Laboratory for a short period of training.

DAVEY TREE SURGEONS

George W. Barnett, superintendent, Morris Whitridge estate, Adamsville, Rhode Island, and a view of the famous "Avenue" on the estate which is visited by hundreds of tourists yearly

The tribute of George W. Barnett to Davey Tree Surgery

Adamsville, Rhode Island.

The Davey Tree Expert Co., Inc., Kent, Ohio.

Gentlemen: Last year your experts treated a number of trees on the estate of Mr. Morris Whitridge, of which I am in charge.

I naturally was interested in this work, as the particular trees treated had previously been filled with cement. When this crude filling was removed, revealing the hidden decay, I was curious to find out if the same thing would happen again in a few years after your men had completed their work.

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George W. Barnett, superintendent.

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Father of Tree Surgery

Every real Davey Tree Surgeon is in the employ of The Davey Tree Expert Co., Inc., and the public is cautioned against those falsely representing themselves

BOOKS ON FORESTRY

AMERICAN FORESTRY will publish each month, for the benefit of those who wish books on forestry, a list of titles, authors and prices of such books. These may be ordered through the American Forestry Association, Washington, D. C. Prices are by mail or express prepaid.

FOREST VALUATION—Filibert Roth	$1.50
FOREST REGULATION—Filibert Roth	2.00
PRACTICAL TREE REPAIR—By Elbert Peets	2.00
THE LUMBER INDUSTRY—By R. S. Kellogg	1.10
LUMBER MANUFACTURING ACCOUNTS—By Arthur F. Jones	2.10
FOREST VALUATION—By H. H. Chapman	2.00
CHINESE FOREST TREES AND TIMBER SUPPLY—By Norman Shaw	2.50
TREES, SHRUBS, VINES AND HERBACEOUS PERENNIALS—By John Kirkegaard	1.50
TREES AND SHRUBS—By Charles Sprague Sargent—Vols. I and II, 4 Parts to a Volume—Per Part	5.00
THE TRAINING OF A FORESTER—Gifford Pinchot	1.35
LUMBER AND ITS USES—R. S. Kellogg	1.15
THE CARE OF TREES IN LAWN, STREET AND PARK—B. E. Fernow	2.17
NORTH AMERICAN TREES—N. L. Britton	7.30
KEY TO THE TREES—Collins and Preston	1.50
THE FARM WOODLOT—E. G. Cheyney and J. P. Wentling	1.75
IDENTIFICATION OF THE ECONOMIC WOODS OF THE UNITED STATES—Samuel J. Record	1.25
PLANE SURVEYING—John C. Tracy	3.00
FOREST MENSURATION—Henry Solon Graves	4.00
THE ECONOMICS OF FORESTRY—B. E. Fernow	1.61
FIRST BOOK OF FORESTRY—Filibert Roth	1.10
PRACTICAL FORESTRY—A. S. Fuller	1.50
PRINCIPLES OF AMERICAN FORESTRY—Samuel B. Green	1.50
TREES IN WINTER—A. S. Blakeslee and C. D. Jarvis	2.00
MANUAL OF THE TREES OF NORTH AMERICA (exclusive of Mexico)—Chas. Sprague Sargent	6.00
AMERICAN WOODS—Romeyn B. Hough, 14 Volumes, per Volume	7.50
HANDBOOK OF THE TREES OF THE NORTHERN U. S. AND CANADA, EAST OF THE ROCKY MOUNTAINS—Romeyn B. Hough	6.00
GETTING ACQUAINTED WITH THE TREES—J. Horace McFarland	1.75
PRINCIPAL SPECIES OF WOOD; THEIR CHARACTERISTIC PROPERTIES—Chas. H. Snow	3.50
HANDBOOK OF TIMBER PRESERVATION—Samuel M. Rowe	5.00
TREES OF NEW ENGLAND—L. L. Dame and Henry Brooks	1.50
TREES, SHRUBS AND VINES OF THE NORTHEASTERN UNITED STATES—H. E. Parkhurst	1.50
TREES—H. Marshall Ward	1.50
OUR NATIONAL PARKS—John Muir	1.91
LOGGING—Ralph C. Bryant	3.50
THE IMPORTANT TIMBER TREES OF THE UNITED STATES—S. B. Elliott	2.50
FORESTRY IN NEW ENGLAND—Ralph C. Hawley and Austin F. Hawes	3.50
THE PRINCIPLES OF HANDLING WOODLANDS—Henry Solon Graves	1.50
SHADE TREES IN TOWNS AND CITIES—William Solotaroff	3.00
THE TREE GUIDE—By Julia Ellen Rogers	1.00
MANUAL FOR NORTHERN WOODSMEN—Austin Cary	2.12
FARM FORESTRY—Alfred Akerman	.57
THE THEORY AND PRACTICE OF WORKING PLANS (in forest organization)—A. B. Recknagel	2.10
ELEMENTS OF FORESTRY—F. F. Moon and N. C. Brown	2.20
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FRENCH FORESTS AND FORESTRY—By Theodore S. Woolsey, Jr.	2.50
MANUAL OF POISONOUS PLANTS—By L. H. Pammel	5.35
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MANUAL OF TREE DISEASES—Howard Rankin	2.50
FRANCE, THE FRANCE I LOVE—By Dr. Du Bois Loux, Pauline L. Diver, New York City	1.50

*** This, of course, is not a complete list, but we shall be glad to add to it any books on forestry or related subjects upon request.—EDITOR.**

FORESTRY IN LOUISIANA

REFORESTATION of Louisiana and conservation of those forests already standing in the state is the purpose of a popular movement which has been inaugurated through the efforts of R. D. Forbes, superintendent of Forestry for Louisiana. An association has been organized, and one of its chief purposes will be the promotion of public sentiment in favor of the utmost co-operation in the prevention and suppression of forest fires.

Mr. Forbes believes that one of the chief causes of waste in lumber building materials is forest fire. The state still has extensive areas of forest, and it is the plan to save as much as possible of them for the uses of industry and the public through an active campaign against forest fires.

BURN WOOD AND SAVE COAL

PLANTING TREES IN A NEW WAY

PARK COMMISSIONERS are supposed to be pretty wise in matters pertaining to trees, but the more open-minded among them are constantly learning new wrinkles. The old saying that experience is a great teacher applies in tree lore as well as in many other lines of human endeavor.

Mr. William J. Butler, general manager of the Board of Commissioners of West Park, Joliet, Illinois, a few years ago read in the magazines that dynamite was great stuff to use in preparing holes in which to plant young trees. But he was a conscientious man, and did not feel it would be right to try out experimental ideas in the public park, which was entrusted to his care, so he determined to test it in his own private orchard.

He ordered from a nursery some Early Richmond cherry trees, some Siberian crabs and several other varieties of apples and decided to plant them in blasted soil.

But, realizing the need of something to compare with, in order to see just what the advantages might be of the new method, he induced some of his neighbors to order some of the same stock, from the same nursery, and plant it at the same time, in soil of similar characteristics, in spade-dug holes.

Mr. Butler says the tree holes on his place were blasted with half sticks of dynamite. The neighbors dug their holes in the good, old-fashioned way.

All the trees were two-year-old nursery stock. Three years after planting, Mr. Butler writes:

"My trees are actually twice as large, and look healthier in every way. I had plenty of cherries and crab apples this season, also some other apples, while there was not the sign even of a blossom on the trees planted in the undynamited soil. Trees on both places have had practically the same care, so I am satisfied in my own mind that the difference in growth is due entirely to the different modes of planting.

"All I knew about dynamite as used in tree planting was what I had read in the magazines, and I was merely experimenting when I planted my trees. But I want to say now that if I had 40 orchards to plant not a tree would be set out that was not in a dynamited hole."

Evidently Joliet citizens residing near West Park may be expecting to be treated to a little display of fireworks the next time any trees are to be set out in the park. If Mr. Butler will do the planting on the 4th of July it will be unnecessary for the boys of that neighborhood to invest any money in firecrackers to fittingly celebrate the glorious day that typifies our independence.

CURRENT LITERATURE

MONTHLY LIST FOR MARCH, 1919

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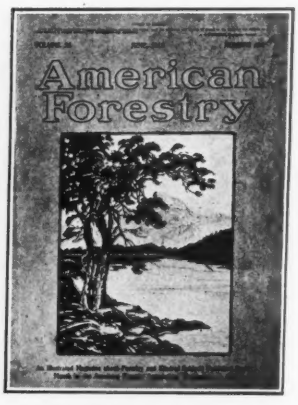

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